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VETERINARY STUDENT ENROLLMENT FOR 1935-1936

Reports received from the deans of the twelve veterinary colleges in the United States and Canada indicate a further increase in the enrollment of veterinary students for the current college year. The increase of 332 students this year is slightly in excess of the increase of 316 reported one year ago. It should be kept in mind that the figures contained in these annual surveys, beginning with the college year 1932-33, include so-called pre-veterinary students in some of our educational institutions. In the following analysis of the present situation, we will attempt to give due consideration to this fact in order that erroneous conclusions may not be drawn.

According to the reports, there are 2,198 students enrolled in the twelve veterinary colleges. Of this number, 19 are graduate students, pursuing post graduate studies for advanced degrees in most cases. These graduate students are veterinarians and, of course, when they finish their present studies, they will not increase the total number of graduate veterinarians. This fact would reduce the number of potential new veterinarians to 2,179.

In the accompanying table, seven veterinary colleges are credited with having 369 special students. The reports indicate that 338 of this number are students enrolled for the so-called pre-veterinary year, leaving 31 others to be accounted for. These students are irregular in that they cannot be definitely classified as belonging to any particular class, freshman, sophomore, junior or senior. However, these 31 students are candidates for the veterinary degree and should be added to the 1,810 students enrolled as freshmen, sophomores, juniors and seniors, making a grand total of 1,841 students who may be expected to complete the work for the veterinary degree within the next four years. More than one-third of the total are to be found in the freshman class. Here we have 668 students, as compared with 572 freshmen a year ago.

It is rather interesting to note that although there were 572 freshmen reported from the twelve colleges last fall, these same institutions report only 480 sophomore students this year. It would appear that almost a hundred students who started the study of veterinary medicine one year ago have either discontinued these studies or were unable to keep up with the work of their class. One year ago, there were 307 sophomore students reported and this year the number of junior students is 332. Likewise, a year ago, there were 309 junior students in the twelve colleges, whereas this fall these same institutions report 330 seniors. These apparent discrepancies may be accounted for in quite a variety of ways. One that would probably account for the greatest number is in connection with so-called irregular students of past years, who this year are definitely assigned to one of the upper classes. Transfers of students with advanced standings, or students who were not in college last year but who have returned to resume their studies this year, explain some of these increases.

It will be noted that the number of seniors this year is considerably below the number reported for 1934-35. Note too that the number of junior students is approximately the same as the number of senior students. The figures for these two classes would indicate that we can expect about 300 graduates in 1936, and about the same number in 1937. There were 363 in 1935.

All of the foregoing comments have been made on the situation as a whole and without any attention being given to the state of affairs in each of the twelve colleges. It should be kept in mind that six of these (Colorado, Cornell, Iowa, Kansas, Michigan and Ohio) are now on the so-called five-year basis, that is, these institutions require a year of pre-veterinary work for

entrance. In all of these colleges, with the exception of Cornell University, the pre-veterinary students are either registered as such, or it is possible to determine the number with a fair degree of accuracy.

Pennsylvania has announced that a year of pre-veterinary work will be required of all veterinary students entering the institution next year. Alabama, Montreal, Ontario, Texas and Washington continue on the old four-year basis. It will be noted that several of the four-year schools report unusually large freshman classes this year. From what we know of the situation in some of these institutions, it would be perfectly in order to ask how they expect to take care of such a large number of students adequately.

The increase in the number of students in some of our veterinary colleges has become such a serious problem that definite steps have been taken to limit the enrollment of students. Very rigid selection is practiced by some institutions. Dean Hagan reports that 166 prospective students applied for admission to the New York State Veterinary College this fall, and only 39 of these were accepted. Dean Giltner reports that a large number of applicants were declined admission to Michigan State College this year, as the institution can accommodate only a limited number of veterinary students. Right here it would be in order to

Veterinary student enrollment for the college year 1935-1936

	FR.	SOPH.	JUN.	SEN.	SPEC.	GRD.	TOT.	1934-35	CHG.
Alabama Poly. Inst. . .	78	34	36	33	0	0	181	115	+ 66
Colorado State Coll. . .	42	19	13	18	64*	0	156	120	+ 36
Cornell University. . .	39	32	33	26	0†	6	136	163	- 27
Iowa State Coll.	55	56	31	32	65‡	1	240	210	+ 30
Kansas State Coll. . .	113	38	30	24	105§	1	311	230	+ 81
Michigan State Coll. . .	24	29	21	27	38*	4	143	105	+ 38
Montreal, Univ. of. . .	19	10	7	7	0	0	43	39	+ 4
Ohio State Univ.	75	60	20	56	86*	7	304	278	+ 26
Ontario Vet. Coll. . . .	63	61	32	47	0	0	203	184	+ 19
Penna., Univ. of. . . .	59	42	46	31	9	0	187	170	+ 17
Texas A. & M. Coll. . .	75	49	28	14	2	0	168	114	+ 54
Washington, S. C. of. .	26	50	35	15	0	0	126	138	- 12
Totals (1935-36)	668	480	332	330	369	19	2198	1866	+332
Last year	572	307	309	380	276	22	1866	1550	+316

*Pre-veterinary students.

†New York State Veterinary College at Cornell University does not include pre-veterinary students in enrollment figures.

‡Includes 63 pre-veterinary students.

§Includes 87 pre-veterinary students.

||Total number of students for 1933-34.

direct attention to the fact that the four classes at East Lansing are unusually well balanced as far as the number of students in each class is concerned.

Dean Brumley, speaking of the situation at Ohio State University, reports that the College of Veterinary Medicine is using a method of selecting students similar to that employed by the College of Medicine, and by another year this system will be in complete operation, so that it will be possible to control the number of students matriculating in the College of Veterinary Medicine. Pennsylvania has been doing substantially the same thing for several years, as the School of Veterinary Medicine can accommodate only about 50 students in each of the four classes.

Kansas, with 113 freshmen and 87 pre-veterinary students this fall, has found it necessary to take steps toward limiting the enrollment of veterinary students, and the State Board of Regents, at its session on October 18, adopted a resolution having for its purpose the limiting of the enrollment of veterinary students to 200, the number that can be cared for adequately by the institution with its present veterinary personnel, buildings and equipment. Students from Kansas are to be given the preference over students from other states, and students from other states not maintaining veterinary colleges are to be given second preference. In the selection of veterinary students entering the Manhattan institution, scholarship and other evidences of fitness are to be made the basis for admission.

Ever since Iowa State College adopted the five-year curriculum, it has been necessary for the institution to restrict the enrollment of veterinary students to a certain degree, preference being given to residents of Iowa over those of other states. As is the case with practically every one of our veterinary colleges, the one at Ames can give adequate instruction to only a limited number of veterinary students. It is reported that the Ontario Veterinary College has found it necessary to place some restrictions on students entering the institution, preference being given to Canadian students over those from the United States and other countries.

The physical limitations of our veterinary colleges for handling students is not necessarily the only consideration to be given to the subject. Of equal importance is the question of limiting the number of graduates to the number of veterinarians that can be absorbed by the profession each year, without unnecessarily crowding it. It is estimated that there are 25 per cent more physicians in the United States than are actually needed at the present time. On the other hand, it has become pretty generally

known throughout educational circles that the veterinary profession is about the only one of the various professions that is not overcrowded. This fact seems not to have been generally appreciated until recently. The increase in the number of students now applying for admission to our veterinary colleges is the perfectly logical sequel.

In any discussion of the subject of veterinary education, it would be perfectly in order to point out that as far as the profession as a whole is concerned, the full benefit of restricting enrollment in some of our veterinary colleges is not going to be realized as long as the other institutions welcome with open arms many of those who are declined admission by the colleges having more stringent entrance requirements.

VETERINARY HISTORY

A well-known veterinarian has stated that a majority of the veterinarians in this country know little or nothing concerning the history of their profession, not necessarily that part which might be referred to as ancient history, but more particularly that of the nineteenth century, dealing with the veterinary profession in the United States. To many persons history is a dry subject. Perhaps that explains the lack of interest in it upon the part of so many.

One reason for so much ignorance concerning our profession in the past is to be found in the almost complete absence of anything in the shape of a systematically recorded history. There have been a few disconnected attempts made to record the histories of certain veterinary institutions and organizations, but nothing in the shape of a history of the veterinary profession in this country has been written until just recently. Drs. L. A. Merillat and D. M. Campbell have performed this service in their book, "Veterinary Military History of the United States," just off the press. Further comment is reserved, as the first volume of this work is reviewed in this issue of the JOURNAL. Read it.

VETERINARY BIOGRAPHY

Closely associated with history is biography. Men are responsible for most of the events that make and become history. Most men, however, contribute little, or nothing, that becomes history. To make history is a distinction that belongs to the few. Dr. J. P. Foster is responsible for the statement that 21,125 veteri-

narians have been graduated from the forty-six veterinary colleges that have existed or are now operating in the United States and Canada. Available information would indicate that, at the very outside, not over 12,000 of these men are living. This means that over 9,000 have died. How many of these have made real contributions to American veterinary history? A hard question to answer and one subject to individual opinion. However, one per cent would probably include all. This would mean not over 100 names. Now, having agreed that there have been 100 veterinarians who made worthwhile contributions to veterinary medicine during their lives, how many could you name offhand?

There is no desire upon our part to criticize our veterinary colleges. These institutions have been the targets of abuse on too many occasions for their acts of omission. "They ought to teach more of this," or "They ought to give more attention to that," is heard frequently and whenever veterinarians get together nowadays. However, after all is said and done, the fact remains that a student can complete his course at almost any veterinary college without learning very much about the history of his profession, or even the names of more than half a dozen veterinarians prominently identified with the profession. This is not true of medicine. Nor is it true of law. Why should it be true of veterinary medicine?

For some time past, we have planned a series of biographical sketches for publication in the JOURNAL, dealing with pioneer American veterinarians. With a very few exceptions, about the only biographical data available concerning many veterinarians are to be found in incomplete, hastily and, too often, inaccurately prepared obituaries published in our veterinary journals. The first of this biographical series will appear shortly. It will cover the life of the late Dr. William Herbert Lowe, president of the A. V. M. A., 1905-06, and pioneer New Jersey veterinarian.

EXECUTIVE BOARD ELECTION

An unusual amount of interest is being taken in the special election being held in Executive Board District 8 (Kansas, Missouri, Oklahoma, Arkansas, Texas and Louisiana), if one may judge from the number of ballots cast to date. This election is being held to select a successor to Dr. J. C. Flynn, who resigned as a district member of the Executive Board following his election to the presidency at Oklahoma City. The member who is elected will finish out the unexpired term of Dr. Flynn, who had been elected to serve until 1936. The polls for the

nomination of candidates will be closed November 11, and as soon as possible after that date the ballots for the election proper will be placed in the mail. There are 446 members qualified to vote in District 8, as of November 1.

APPLICATIONS FOR MEMBERSHIP

Fifteen more applicants for membership. This number brings the total for 1935 within striking distance of the 300 mark. During the three years 1932, 1933 and 1934, the number of applications listed reached only 311. In only three years during the past ten have the applications exceeded the 300 mark. The number listed this month is the largest for November in any year since 1928, which was one of the big years. We would like to receive about 20 applications this month, to be listed in December. The number mentioned would break all records for this month. Also, it would put the 1935 total safely over the 300 mark. What do you say? Will you try to get one new member?

(See July, 1935, JOURNAL)

FIRST LISTING

- ADAMS, EDWARD B. Menno, S. Dak.
D. V. M., Chicago Veterinary College, 1918
Vouchers: G. E. Melody and E. E. Flory.
- DAMAN, LT. ARTHUR H. L. 217 Roup Ave., Pittsburgh, Pa.
D. V. M., Kansas State College, 1935
Vouchers: Maj. Frank H. Woodruff and Col. Robert J. Foster.
- EMAS, JACK R. 638 E. Water St., Lock Haven, Pa.
V. M. D., University of Pennsylvania, 1935
Vouchers: Maj. Frank H. Woodruff and Col. Robert J. Foster.
- FARKAS, ALBERT B. 4321 N. Crawford Ave., Chicago, Ill.
M. V., Royal Hungarian Veterinary College, 1908
Vouchers: O. Norling-Christensen and G. S. Elwood.
- KERR, LT. GEORGE M. 8 Garfield Ave., Hyattsville, Md.
D. V. M., Kansas State College, 1935
Vouchers: Maj. Frank H. Woodruff and R. R. Dykstra.
- KOCH, BERNARD 621 W. Lombard St., Baltimore, Md.
B. S., D. V. M., State College of Washington, 1935
Vouchers: Mark Welsh and E. B. Simonds.
- MCCORKLE, HAROLD C. Redmond, Wash.
B. S., D. V. M., State College of Washington, 1931
Vouchers: C. E. Sawyer and V. C. Pahlman.
- MACDONALD, HUGH E.
Veterinary Research Station, Box 639, Lethbridge, Alta.
B. V. Sc., Ontario Veterinary College, 1929
Vouchers: L. M. Heath and J. C. Hargrave.
- MICHEL, HERMAN A. Carthage, S. Dak.
D. V. M., McKillip Veterinary College, 1916
Vouchers: G. E. Melody and C. H. Hays.
- RUEHLE, OTTO, JR. 1710 S. E. Belmont St., Portland, Ore.
D. V. M., Cornell University, 1922
Vouchers: Jas. B. Harrison and E. E. Chase.

- RUGGLES, GEORGE A. 8821 Aurora Ave., Seattle, Wash.
D. V. M., Colorado State College, 1933
Vouchers: C. M. Hamilton and C. E. Sawyer
- SPAYTH, GUY V. Bloomville, Ohio
D. V. M., Grand Rapids Veterinary College, 1915
Vouchers: E. P. Maxwell and R. N. Birdwhistell.
- STUDER, SEBASTIAN N. Steamboat Springs, Colo.
D. V. M., Colorado State College, 1933
Vouchers: G. E. Melody and Marvin S. Thorpe.
- WOHNSIEDLER, GEORGE 129 Church St., Carthage, N. Y.
D. V. M., Cornell University, 1930
Vouchers: E. Sunderville and Donald W. Baker.
- WOODHOUSE, CLARENCE A. 914 Studer Ave., Columbus, Ohio
D. V. M., Ohio State University, 1935
Vouchers: W. F. Guard and Walter R. Krill.

Applications Pending

SECOND LISTING

(See October, 1935, JOURNAL)

- Blake, Gordon W., 1217 W. Third St., Waterloo, Iowa.
Burke, Francis P., Geneva, Neb.
Ellis, Joseph L., 228 S. 54th St., Tacoma, Wash.
Ferron, Eugene, 715 Arch St. N. S., Pittsburgh, Pa.
Gapuz, Domingo B., Nanning, Kwangsi, China.
Knapp, John W., Litchfield, Conn.
Kramer, William N., 2029 Salem Ave., Dayton, Ohio.
Lucich, Frank A., 517 E. Third St., Cle Elum, Wash.
Mauney, Jacob P., Kings Mountain, N. C.
Mendenhall, William I., 325 B St. N. E., Auburn, Wash.
Pieper, Niel W., 89 Hartford Ave., Middletown, Conn.
Sorenson, Oscar J., Jr., 318½ E. Michigan Ave., Lansing, Mich.
Werrin, Nathaniel, 1104 N. 41st St., Philadelphia, Pa.
Woodruff, Abram D., Box 464, Albuquerque, N. M.
Wright, Vincent B., Fayetteville, N. C.
Wupperman, Ernest W., 502 Texas Ave., Austin, Texas.

The amount which should accompany an application filed this month is \$5.83, which covers membership fee and dues to January 1, 1936, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

- Connecticut Veterinary Medical Association. Dr. C. H. Beere's Hospital, Waterbury, Conn. November 6, 1935. Dr. Edwin Laitinen, Secretary, 993 N. Main St., West Hartford, Conn.
- New York City, Veterinary Medical Association of. Hotel New Yorker, 8th Ave. and 34th St., New York, N. Y. November 6, 1935. Dr. R. S. MacKellar, Jr., Secretary, 329 W. 12th St., New York, N. Y.
- Illinois Veterinary Conference, University of. University of Illinois, Urbana, Ill. November 7-9, 1935. Dr. Robert Graham, Division of Animal Pathology and Hygiene, University of Illinois, Urbana, Ill.

- Southern States Veterinary Medical Association. Piedmont Hotel, Atlanta, Ga. November 7-9, 1935. Dr. M. R. Blackstock, Secretary, 157 W. Hampton Ave., Spartanburg, S. C.
- Ak-Sar-Ben Veterinary Medical Association. Elks Building, Omaha, Nebr. November 11, 1935. Dr. J. N. McInay, Secretary, 3251 Leavenworth St., Omaha, Neb.
- Chicago Veterinary Medical Association. Palmer House, Chicago, Ill. November 12, 1935. Dr. O. Norling-Christensen, Secretary, 1904 W. North Ave., Chicago, Ill.
- San Diego County Veterinary Medical Association, San Diego, Calif. November 12, 1935. Dr. L. K. Knighton, Secretary, 3438 Mountain View Dr., San Diego, Calif.
- Hudson Valley Veterinary Medical Society. Poughkeepsie, N. Y. November 13, 1935. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.
- Southeastern Michigan Veterinary Medical Association. Detroit, Mich. November 13, 1935. Dr. F. D. Egan, Secretary, 17422 Woodward Ave., Detroit, Mich.
- Willamette Valley Veterinary Medical Association. Chamber of Commerce, Hillsboro, Ore. November 13, 1935. Dr. Elwyn W. Coon, Secretary, Forest Grove, Ore.
- New Mexico Veterinary Medical Association. Santa Fe, N. M. November 15-16, 1935. Dr. T. I. Means, Secretary, Penn Road, Santa Fe, N. M.
- Southern California Veterinary Medical Association. Chamber of Commerce Building, Los Angeles, Calif. November 20, 1935. Dr. T. G. Beard, Secretary, 3684 Beverly Blvd., Los Angeles, Calif.
- B. A. I. Veterinarians, National Association of. Hotel La Salle, Chicago, Ill. December 4-6, 1935. Dr. F. A. Imler, Secretary, Box 187, Kansas City, Kan.
- United States Live Stock Sanitary Association. Hotel La Salle, Chicago, Ill. December 4-6, 1935. Dr. O. E. Dyson, Secretary, Live Stock Exchange Bldg., Wichita, Kan.
- East Tennessee Veterinary Medical Society. White Surgical Supply Building, Knoxville, Tenn. December 7, 1935. Dr. Robert L. Hummer, Secretary, 312 W. Church Ave., Knoxville, Tenn.
- Nebraska State Veterinary Medical Association. Evans Hotel, Columbus, Neb. December 10-11, 1935. Dr. E. C. Jones, Secretary, c/o Norden Laboratories, Grand Island, Neb.

SWINE ERYSIPELAS*

By T. W. MUNCE, Allied Laboratories, Sioux City, Iowa

Field observations and investigational work reported by American veterinarians during the last four or five years would appear to warrant the conclusion that swine erysipelas should be included in the group of serious infectious diseases which affect American swine.

Most of these reports concern clinical observations or laboratory findings limited to the above-mentioned period, but many of them refer to historical evidence or to other facts suggesting that the disease may have existed in some parts of our country for a number of years. In this connection it may be important to consider the fact that the causative organism of swine erysipelas was isolated from swine in the United States as early as 1885, by Theobald Smith.¹ Its isolation from swine was reported again in 1892, by Veranus A. Moore.² American veterinary literature was then practically silent on the subject until the period extending from 1920 to 1925; we then again find references to isolation of the causative organism and discussions concerning its possible pathological significance by such workers as TenBroeck,³ Creech,⁴ Ward,⁵ Giltner,⁶ Parker, Lockhart and Ray,⁷ and possibly others. Most of these reports referred to chronic or benign forms of the infection, although Giltner's report concerned a fatal bacteriemic condition in one litter of pigs. In 1928, Kinsley⁸ reported the identification of an acute fatal type of the malady in several states. It was not until about 1930, however, that the infection was encountered and identified, by Fosterman and Breed (Munce and Willey⁹), as an acute septicemic condition affecting a material number of animals in a herd and a substantial number of herds in a community.

At the present time it would be impossible to designate the geographical limits of the disease in the western hemisphere. Some idea of its extent is suggested by scientifically confirmed reports of its existence at such widely separated points as Texas,¹⁰ New York,¹¹ Saskatchewan¹² and Brazil.¹³ Its distribution in the United States is indicated by an article submitted for publication in October, 1933, by Stiles and Davis.¹⁰ These writers designated 17 states in which swine erysipelas had been definitely diagnosed. No doubt additional states have been added to the list since that time. The known distribution of the disease

*Presented at the seventy-second annual meeting of the American Veterinary Medical Association, August 27-30, 1935, Oklahoma City, Okla.

is sufficient to be very disturbing. However, the full potentialities of its menace to our swine-raising industry can be appreciated only when we consider the extent to which the interstate and intersectional transportation of swine is practiced in this country.

The economic importance of swine erysipelas in the United States can not be determined until the depleted swine population of our chief hog-raising sections returns to normal and until traffic in swine returns to normal. We can at least state that at the present time the disease continues to be encountered or recognized in new centers, thus indicating a continuation and possibly a spread of the infection.

The disease in North America to date has not constantly demonstrated the high degree of severity nor the strong epizootic tendency, both of which characterize it in European countries. On the other hand, its history to the present time presents little evidence to warrant a conclusion that an increase in its virulence or epizootic tendency might be impossible, or even improbable. In fact, the evidence seems to indicate that its virulence has already increased, at least to a degree which has rendered hog-raising an unprofitable procedure on some American farms.

Reports of American observers seem to indicate that the clinical manifestations of the disease may vary slightly in different parts of the United States. In view of that possibility, we wish to explain that the following description concerns the disease as it has been observed in the swine of South Dakota, Iowa and Nebraska. In these states it might be described as a specific infectious condition occurring in sporadic, enzootic or epizootic forms. It has been characterized by septicemic manifestations in its acute forms and by a number of secondary developments or complications in its more chronic forms.

Swine erysipelas is caused by *Erysipelothrix rhusiopathiae*, a slender, Gram-positive, non-sporulating, rather highly resistant, rod-like or thread-like organism, which is infectious for swine, sheep, rabbits, white mice, gray mice and pigeons. European investigators report isolations of the organism from cattle, chickens, turkeys and ducks, in which animals its pathological significance has not been definitely determined. At this meeting, Dr. F. R. Beaudette, of New Brunswick, New Jersey, will discuss the first outbreak of acute swine erysipelas infection reported in American turkeys. The organism is infectious for man and already has infected a number of our American people, including twelve veterinarians with whom we are personally acquainted. More than one thousand cases of the infection have

been studied by Klauder¹⁴ and his co-workers, in persons engaged in handling fish along our Atlantic Coast. American physicians are beginning to diagnose the infection in packing-house workers, button-factory workers, farmers and other persons engaged in the handling of live stock, meat and their by-products.

SEASONAL PREVALENCE

The disease in swine has been most prevalent during the spring, late summer and fall months. However, it has been observed in all seasons. Its prevalence some years has been much greater than during others. No logical explanation for these fluctuations in prevalence has been advanced.

DURATION OF INFECTION ON PREMISES

On a number of farms the disease has occurred in succeeding pig crops, indicating that the infection may be carried over in the bodies of recovered or healthy swine, or by contaminated premises. The histories of some farms strongly suggest that the disease has occurred on them, periodically, for a period as long as ten years. On other farms, no repetition of an outbreak has occurred.

AGE OF SWINE AFFECTED

It has been observed in swine of all ages, including suckling pigs and aged animals. In our experience it has been observed most frequently in animals ranging from approximately 60 to 160 pounds in weight.

MORTALITY

The mortality has varied greatly. In some untreated herds, practically all of the animals have died. In other untreated herds, the disease ceased spreading and a low mortality resulted when no measures were employed other than the separation of the healthy animals from those visibly affected. One practitioner has estimated that, in untreated herds in his territory, on the average 10 to 20 per cent of the animals die and 10 to 20 per cent develop chronic complications which practically destroy their value. This estimate approximates the mortality cited by Stiles and Davis¹⁰ in a report of their observations on 13 farms in Colorado. There were 709 hogs on these farms; of this number, 200 apparently died of acute swine erysipelas and 131 showed symptoms of the chronic form of the infection.

MANNER OF SPREAD THROUGH HERD

The progress of the disease in untreated herds has been quite inconsistent. In some, it has attacked several animals simul-

taneously and no additional cases have developed. In others, additional groups have been attacked after an interval of several days or weeks. In still other herds, the animals have been attacked more or less individually and new cases have continued to develop daily until the disease ran its course in such herds.

COURSE

When the complete course of a severe attack is manifested by an animal, it might be divided into three periods or stages:

- (1) The acute stage (first three or four days of illness).
- (2) The intermediate stage (from 4th to 10th day of illness).
- (3) The chronic stage (following 10th day of illness).

In many animals and in some entire herds the course deviates from the above. Some animals recover after manifesting symptoms of only the acute stage; some recover after passing through the first two stages; others may manifest symptoms of the chronic stage without any apparent symptoms of the preliminary stages. In some herds, cases of the chronic form have existed for some time before cases of the acute form have been noted.

SYMPTOMS

Acute stage: The history frequently reveals the occurrence of one or more sudden deaths. The sick animals withdraw from the herd. They appear to be quite sick, but when aroused they show an unexpected degree of animation. In this stage there is less mental depression than in the same stage of illness from hog cholera. When disturbed, these seriously ailing animals frequently go to a feeder and eat, before retiring to an isolated spot where they may be found dead a few hours later.

The temperature is quite regularly elevated and ranges from 104 to 106° F. Respiration is usually increased. The appetite may be diminished, but it is rarely entirely impaired. In uncomplicated cases coughing, diarrhea and vomiting have not been observed. There is some tendency towards constipation. Rather characteristic early symptoms are a stiff gait and arching of the back. These symptoms may be due to tenderness of the abdominal organs or of body muscles; they may also be due to arthritis, which becomes more apparent later in the attack.

The greatest proportion of the deaths have occurred during the acute stage of the disease, at the conclusion of which stage the animals either recover or progress to the intermediate stage.

Intermediate stage: This stage is characterized by extreme weakness and prostration. The affected hogs are frequently

found lying on their sides; when lifted, they may collapse and remain lying in any unnatural position in which they fall. If they are able to walk, the gait is stiff and stilted.

The temperature frequently reaches 108° F. Inappetence is complete. The feces may be soft and of a brown or greenish color, but no diarrhea has been observed in uncomplicated cases. Stocking or swelling of the legs is observed frequently, as well as swelling of the skin of the eyelids, snout and ears. The skin of the abdomen, axillae and other thinly covered portions of the body may assume a red or purplish-red color. The skin of the shoulders, back or sides may present infiltrated or thickened areas varying in size from those resembling insect bites to those involving almost the entire back. During the last few days of this stage, early indications of an arthritis involving one or more joints of the legs may be noted. Most of the deaths in this stage occur near its conclusion. The surviving animals either recover or convalesce to the chronic stage of the attack.

The "intermediate" stage, or stage of prostration, has been observed frequently in South Dakota cases; however, in many cases there and in other states it has not been noted.

Chronic stage: The temperature returns to approximately normal. The affected animals regain some strength, but they are quickly exhausted by forced exercise. They spend a great amount of time lying down and are frequently found lying on the sternum or sitting upright in order to facilitate respiration.

The appetite may improve for a time and then decline. Labored breathing and a chronic cough are frequently observed. Arthritis is commonly a prominent development. It results in swollen joints of the legs, a peculiar stiff gait and an arched top-line. We have observed arthritis involving even the joints of the tail. Gangrenous processes involving the ears, snout, tail or areas of the skin of the back or sides may be noted in at least some of the affected animals.

The chronic stage is characterized by secondary developments and complications. Therefore, a great variety of symptoms may be observed. It is believed that most of the deaths occurring during this stage are caused by complications such as pneumonia, enteritis, carditis, hepatitis, and so forth, rather than by the specific infection.

LESIONS

Acute and intermediate stages: The nature and extent of the lesions vary to a degree which is frequently very confusing to the observer. Early in an attack, they may be so slight as to

escape observation; they also vary with the severity of the attack and the extent to which the disease has progressed in its course. The skin of the thinly covered portions of the body is frequently of a red or purplish-red color. Areas of the skin of the sides or back are sometimes thickened or infiltrated. The eyelids, ears or snout may be swollen. The legs may show stocking. The subcutaneous fat may be of a muddy or yellowish color. The abdominal cavity may contain an abnormal quantity of straw-colored fluid. In some instances this fluid has coagulated, in which event the abdominal organs are enmeshed in a network of fibrin. The spleen may be practically normal, or it may reveal only a few small, dark, raised areas on its surface. In some instances it is enlarged, dark in color and soft in consistency. The latter changes may extend throughout the entire organ or they may be limited to one portion of it.

The liver frequently is enlarged, firm to the touch, brittle and engorged with blood or bile. The kidneys are usually light in color, friable and may present a few petechiae. The mucous membrane of the bladder often is congested and may reveal some hemorrhagic areas. In our experience the lymph-glands frequently have presented evidence of considerable diagnostic assistance; in the early stage of an attack they may be enlarged and succulent, due to the presence of a clear or amber-colored fluid. After several days of illness, these glands may become engorged with blood; when such engorged glands are incised, the escaping fluid may be blood-tinged. Petechiation of the lymph-glands seldom is observed, but, when encountered, it frequently is limited to one or two glands in the carcass.

The mucous membrane of the stomach quite commonly presents evidence of some stage of gastritis and usually reveals an abnormal quantity of shining mucus. The much discussed "paint brush" hemorrhagic lesion has been observed on the serous coat of the stomach in a few positive cases. The pericardial sac may contain an abnormal quantity of straw-colored fluid. The epicardium frequently reveals irregular hemorrhagic patches over the auricles. The lungs, in uncomplicated cases, seldom present gross lesions. In some instances, pin-head to pea-sized hemorrhages may be noted on their surfaces.

LESIONS

Chronic stage: The lesions in this stage depend upon the complications present. Thus, we may find pneumonia, enteritis, carditis, and so forth. Possibly those possessing the greatest diagnostic value include arthritis, gangrenous processes of the

skin, ears and tail, and an unusual type of endocarditis. This heart lesion, when present, involves the valve between the left auricle and left ventricle. The valve may be greatly thickened and to it may be attached a cauliflower-like deposit of fibrin or fibrinous tissue, having a diameter in some cases as great as one-half to three-fourths of one inch.

In this stage, many of the internal organs, such as the liver, spleen and lymph-glands, may present evidence of chronic inflammatory changes; therefore, they are frequently subnormal in size and firm in consistency. Occasionally the serous surfaces of the abdominal organs possess a pronounced roughened appearance due to deposits of shreds of fibrous tissue. Gross changes are frequently encountered in the lungs during this stage. Their surface may be studded with pin-head to pea-sized hemorrhages; they also may reveal edematous infiltration or pneumonia of various types and degrees.

In our discussion of symptoms and lesions, we wish to state that our field experience with swine erysipelas in suckling pigs has been quite limited. We have been informed by other observers, however, that the symptoms and lesions in these young animals differ materially from those observed in older pigs and hogs; also that the various stages in the course of an attack are less distinct, that a diarrhea is frequently observed, and that a mortality of 85 per cent is not uncommon.

DIAGNOSIS

In the foregoing discussion we have endeavored to describe some of the features of the disease which are apparently of some diagnostic value. Our experience has convinced us, however, that swine erysipelas, especially in the acute and intermediate stages, may readily be confused with a number of other infectious diseases of swine—including hog cholera. We, therefore, do not hesitate to recommend that positive diagnoses of swine erysipelas be made only when based upon positive findings in the laboratory examinations of specimens. From acute cases, the blood, spleen and kidney have proven very satisfactory specimens for examination. From chronic cases, the heart and an enlarged joint, if available, should be included with the specimens submitted.

Breed,¹⁵ and Schoening, Creech and Grey,¹⁶ have developed and described modified serological and blood tests for the diagnosis of swine erysipelas. It is hoped that these may prove sufficiently dependable to expedite the diagnosis of this disease.

The following field procedure, of considerable diagnostic assistance, has been followed by some practitioners: When an illness suggestive of swine erysipelas is encountered in a herd of cholera-immune swine, the well animals are separated from those sick; three or four of the animals, which have sickened within two or three days, are then treated with anti-swine erysipelas serum; the serum-treated animals are observed at the end of 24 to 48 hours and a pronounced improvement in their condition is accepted as important evidence that swine erysipelas is at least a factor in the herd disturbance.

TREATMENT

Procedures employed for the control of swine erysipelas in foreign countries quite generally involve the use of anti-swine erysipelas serum and swine erysipelas vaccine. For prophylactic purposes the vaccine is used alone or in conjunction with the serum. For curative purposes the serum alone is used. We have been informed that the immunity resulting from the use of the vaccine or the combined vaccine-serum prophylaxis protects the animals for periods of approximately six months to a year.

In order to avoid the possibility of establishing additional foci of infection in this country, our federal Bureau of Animal Industry has considered it inadvisable to permit the distribution and use of the vaccine—a product containing the living, causative organism. Anti-swine erysipelas serum therefore constitutes the only specific biological agent available to the American practitioner for the treatment and control of the disease.

In our early personal experience with this serum, we believed that it would prove of limited value, since it could confer only a temporary, passive immunity. It was used, therefore, only in the treatment of sick animals or for the protection of healthy animals which had been severely exposed. That procedure is still followed by many practitioners. If only a few members of the herd are sick, they are isolated and treated with the serum; the well animals are removed to uninfected ground and held under observation; if additional cases develop among the well animals, that fact is accepted as evidence that the infection in the herd is rather general and that the balance of the herd should receive the serum. "Breaks" following this procedure have been surprisingly rare. When they have occurred, they usually have been observed in herds in which there were only a few sick animals, or in which there was other evidence that the exposure of the well animals had not been severe at or before the time they received the serum. The foregoing suggests the possibility that

some of the benefits of the serum-vaccine method of treatment may be obtained through the administration of serum alone in conjunction with a sufficient exposure to active infection on the premises. Following that line of thought, some practitioners are experimenting with the procedure of placing the sick animals back in the herd, after a positive diagnosis has been made and after the well animals have received the serum.

The dose of the serum should be gauged according to the weight of the animal treated. For prophylactic purposes a dosage range of 3 cc to 20 cc is usually employed. The dose for curative purposes should be approximately twice the prophylactic dose.

The potency of anti-swine erysipelas serum is most surprising. In practically every herd the spread of the disease has been checked within 48 hours. The majority of the sick animals treated during the first three or four days of illness have manifested a surprising degree of improvement within 24 to 72 hours. It is of course not logical to expect much benefit from the serum in the treatment of cases in which serious complications already have developed. The majority of the chronic cases either eventually succumb or incompletely recover, to become unprofitable feeders, regardless of the treatment administered.

Before the value of anti-swine erysipelas serum was recognized, practitioners endeavored to use practically all of the other biological products available, including anti-hog cholera serum. The administration of some of these non-specific products apparently was followed by beneficial results, but they were usually only temporary and relapses occurred within a few days. Such products proved of practically no value in preventing the spread of the disease in the herd.

Anti-swine erysipelas serum is a highly specific agent; therefore, the diagnosis which prompts its use must be correct. It will demonstrate little therapeutic value in such conditions as *suipestifer* or paratyphoid infection, swine flu, enteritis and swine plague. Where hog cholera and swine erysipelas both are possible factors in either prophylaxis or treatment, field results to date indicate that it is permissible and advisable to administer anti-swine erysipelas serum in addition to the hog cholera treatment indicated by the circumstances. The administration of hog cholera virus in erysipelas-infected herds has not been followed by the disastrous results which frequently follow its use in herds harboring some of the other swine infections in a dormant form.

A few serious errors have occurred in the field use of anti-swine erysipelas serum; in a few instances this serum has been

employed alone for the treatment of an ailment in cholera-susceptible herds, which ailment proved to be hog cholera. The disastrous results which occur in such herds most forcibly remind us that hog cholera continues to be the most destructive disease of American swine; ordinary prudence, therefore, demands that it be eliminated from every diagnosis, before proceeding to consider the possible existence of some other disease.

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Nebraska Has Lien Law

Nebraska is the third state to enact a veterinary lien law, Iowa and South Dakota already having similar laws in force. The Nebraska law provides, among other things, that "... such veterinarian shall have a first, paramount and prior lien upon such live stock so treated by him for the contract price agreed upon, and in case no price has been agreed upon, for the reasonable value of his services and any medicines or biologics furnished. . ." Dr. P. L. Cady, of Arlington, Neb., member of the State Legislature, was actively identified with the passing of the new law.

THE EVALUATION OF CANINE DISTEMPER VIRUS AND ANTISERUM*

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The consistent production of an active canine distemper virus and a potent anti-canine distemper serum depends largely upon the methods employed in evaluating these two agents. Unless standardized, each lot of the biologics will vary in activity or potency, as the case may be, and naturally produce variable or indifferent results clinically.

With regard to standardizing the virus, Laidlaw and Dunkin,¹ by titrating the desiccated material in a series of ferrets, showed that all those receiving 0.001 milligram sickened on the seventh day after injection and subsequently died.

It was their opinion that the satisfactory standardization of antiserum would require the use of compound-bred dogs, that is, puppies which were born and reared in an environment free from distemper for five or six generations. This test proved impracticable because of the lack of a sufficient number of such animals. They then turned to the use of ferrets for standardizing antiserum, but found that a larger dose was required for this test animal than that which was usually sufficient to protect a three-month-old puppy. This was not surprising when it was recalled that the incubation period of distemper in the ferret was long and that the dog serum was heterologous for that animal.

In their efforts to develop a rapid method of standardization, it was determined that there was no skin reaction with distemper virus and no evidence of precipitins or agglutinins in hyperimmune serum. Ultimately, however, Laidlaw and Dunkin "found that a serum of good protective power, as measured on dogs, also possessed the property of fixing complement in the presence of appropriate antigen." This laboratory procedure permitted the testing of a number of samples in a short time and eliminated many of the unsatisfactory experiences previously encountered with the work on dogs and ferrets.

The results of our early work, which was begun late in 1929, closely paralleled those of the English investigators. In the absence of compound-bred dogs, attempts were made to standardize the antiserum on uniform litters of puppies; also, on ferrets. Only an indication of the serum potency could be obtained by the methods. This was far from being satisfactory.

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Measurable success was attained in the evaluation of the virus by titrating it on ferrets. The procedure, however, was costly and time consuming. By the time the virus titre had been obtained, at least one-half of the 30-day period of activity of the virus had waned. It was imperative to develop a rapid, accurate laboratory test.

Following the example of Laidlaw and Dunkin, the practicability and efficiency of the complement-fixation reaction were investigated. The data herein reported describe the results obtained with this test as a direct means of evaluating the antiserum of distemper and as an indirect method of determining the activity of the virus.

EVALUATION OF CANINE DISTEMPER VIRUS

Distemper virus is obtained either from puppies or ferrets in the form of spleen tissue taken from the infected individuals at a time during the course of the disease when it is present in this organ in its highest concentration. In the puppy, the spleen is removed, after the animal has been chloroformed, during the early phase of the second rise in temperature simultaneously with the appearance of the characteristic conjunctivitis and rhinitis. In the ferret, the tissue is not removed until the animal is moribund. In order to preserve the virus, the spleen tissue is either frozen or desiccated immediately after being taken from the animal.

As previously indicated, attempts were made to determine the minimal lethal dose (m. l. d.) of virus by titration in ferrets. A constant, subcutaneous injection of 1.0 cc of various dilutions of the virus was used in all experiments. With a surprising constancy, the m. l. d. fell in a 1:10,000 dilution and invariably the ferret, from which such virus was obtained, showed an incubation period of nine days, with death occurring in an additional four or five days. Occasional lots of virus had a titre of 1:40,000 and, less often, 1:80,000. In these latter cases, the incubation period was prolonged to as late as 15 days.

This observation has been recorded so many times within the last six years that it has led us to conclude there is a close correlation between the activity of the distemper virus and the incubation period following its injection into the ferret. A constant check on the virulence of the distemper virus, although roughly estimated, can be maintained in this manner.

As a determination of the m. l. d. of each lot of virus is impracticable, it is our routine procedure to evaluate the activity of the virus roughly by observing the course of the disease in

ferrets and correlating the results with the antigenicity of the same virus as it is evidenced in the complement-fixation reaction. This latter phase of the work is described in subsequent paragraphs.

COMPLEMENT-FIXATION TEST

The technic of Kolmer² was employed in our early work with the complement-fixation reaction, but this was ultimately discarded for the more rapid test advocated by Laidlaw and Dunkin.¹ Subsequent to the publication of their procedure, two members of our staff were privileged to visit Laidlaw's laboratory and there obtain detailed data which have proved invaluable to us. For the most part, therefore, the English technic has been closely adhered to, with the exception of a few modifications which have been made to suit our requirements.

Serum, antigen and complement are mixed in specified doses as recorded below. The tubes containing these three reagents are then placed in a water-bath for 30 minutes at 37.5° C. Immediately thereafter, sensitized cells are added and the final mixtures are again subjected to water-bath incubation for 30 minutes at 37.5° C. Readings are made at once, if necessary, but more clear-cut reactions are seen after standing for several hours at ice-box temperature.

Serum: Hyperimmune dog serum invariably proved to be anti-complementary after the addition of a preservative. This factor was eliminated by using fresh serum only in the test. Our standard serum, which is used for antigen titrations and as a criterion of desired potency in the test of all unknown sera, is kept either in a solidly frozen state or in the desiccated form, sealed in ampules.

Natural complement in the serum is destroyed by heating at 56° C. for 20 minutes. The dose in the test is varied from 0.1 cc to 0.01 cc of a 1:5 dilution.

Antigen: Either fresh or frozen, ferret-spleen virus is always used as antigen in routine tests. After the tissue is weighed, it is triturated to a pulpy consistency in a mortar with sterile, finely ground, quartz glass. Sufficient sterile physiological saline solution is then added to make a 20 per cent suspension. This is centrifuged for ten to 15 minutes and the supernatant used as 20 per cent antigen. By diluting with saline, 10, 5, 1 and 0.5 per cent antigens are made. A constant dose of 0.1 cc is used in each tube.

Complement: Normal guinea pig serum is used as complement. It is prepared freshly each day and used in dilutions of from 1:8

to 1:14 in the complement titration. The titre usually falls in a dose of 0.1 cc of a 1:10 dilution. Two or more units, as indicated in subsequent protocols, are used as a working dose.

Sensitized cells: Anti-sheep hemolytic amboceptor, produced in rabbits, is so diluted that it has an approximate titre of 1:1,000 according to the Kolmer technic. Five-tenths cc is added to 49.5 cc of sterile physiological saline solution. After three or four washings, red blood corpuscles (sheep) are prepared in 5 per cent suspension. The cells (50 cc) are sensitized by adding the 50 cc of prepared amboceptor dilution. The mixture is made one hour before use in the test and kept at room temperature.

SPECIFICITY OF COMPLEMENT-FIXATION REACTION

Following the information received from Laidlaw and Dunkin, through a personal communication, that they had been successful in producing an hyperimmune anti-canine distemper serum in a pony, we started to duplicate such work. Two horses were used, each receiving periodic large injections of *distemper-infected ferret-spleen tissue*. Ultimately, we determined that such serum was definitely inferior to homologous (dog) antiserum and production was discontinued.

At the time this work was being conducted, the complement-fixation reaction of Kolmer was being used. By this technic, the sera of the horses were tested before commencing hyperimmunization and found to be void of complement-fixing antibodies. Both normal and infected ferret-spleen tissue was used as antigen in the tests before and during the course of hyperimmunization. Subsequent tests of the serum under production showed four plus fixation of complement with very small doses of serum by both the normal and infected antigens. Normal and infected dog-spleen tissue antigens were then used in place of the ferret-spleen antigens. In the setup with normal dog-spleen antigen and hyperimmune horse serum, no fixation was observed. In the case of infected dog-spleen antigen and the same serum, strong evidence of fixation was obtained.

It was concluded that the fixation by normal ferret-spleen antigen was specific solely for ferret-spleen tissue elements. That which took place when infected ferret-spleen antigen was used was largely of similar specificity and partially specific for the virus. When heterologous antigen, that is, infected dog spleen, was used, the fixation was totally specific for distemper virus.

Similar results were obtained later with the Laidlaw-Dunkin technic. These are shown in protocols A, B, C, D, E and F of

table I. In each case, the dose of complement was 0.2 cc (2 units) and 0.4 cc (4 units). The working dose of serum was 0.1 cc of a 1:5 dilution. One-tenth cc was the dose of each suspension of antigen and 1 cc of sensitized cells was added to each tube.

In interpreting the results shown in the protocols of table I, it is necessary to bear in mind that the hyperimmune distemper antiserum was produced by repeated injections of infected dog-spleen tissue. Protocol A, therefore, shows specific virus fixation and, as would be expected, there is no fixation seen in protocol B.

TABLE I—Results of experiments to determine the specificity of the complement-fixation reaction.

PROTOCOL		UNITS OF COM- PLEMENT	ANTIGEN SUSPENSIONS		
			5%	1%	0.5%
A—Hyperimmune distemper antiserum and infected ferret-spleen antigen	Serum	2	++++	++++	++++
		4	++++	++	—
	Antigen Controls	2	—	—	—
		4	—	—	—
B—Hyperimmune distemper antiserum and normal ferret-spleen antigen	Serum	2	—	—	—
		4	—	—	—
	Antigen Controls	2	—	—	—
		4	—	—	—
C—Hyperimmune distemper antiserum and infected dog-spleen antigen	Serum	2	++++	++++	++++
		4	++++	—	—
	Antigen Controls	2	—	—	—
		4	—	—	—
D—Hyperimmune distemper antiserum and normal dog-spleen antigen	Serum	2	++++	+++	+++
		4	—	—	—
	Antigen Controls	2	—	—	—
		4	—	—	—
E—Normal puppy serum and infected ferret-spleen antigen	Serum	2	—	—	—
		4	—	—	—
	Antigen Controls	2	—	—	—
		4	—	—	—
F—Normal puppy serum and normal ferret-spleen antigen	Serum	2	—	—	—
		4	—	—	—
	Antigen Controls	2	—	—	—
		4	—	—	—

Serum control (2 units of complement), negative in all cases.

—, complete hemolysis.

++, +++ and +++++, gradations of fixation

Protocols C and D show non-specific fixation, or that which is specific for dog-spleen tissue elements. With normal puppy serum, there was no fixation of complement by either normal or infected ferret-spleen antigens (protocols E and F).

TITRATION OF ANTIGEN (VIRUS)

When undertaking the work with the complement-fixation reaction, it was anticipated that it would give us a fairly accurate means of evaluating both the distemper virus and antiserum. It serves this purpose in the case of the serum, but affords only an indirect method of measuring the quality of the homologous (dog) virus.

In order to obtain specific fixation, it is necessary to use infected ferret-spleen tissue as antigen. This is clearly shown in table I. If it were possible to produce a standard serum of high potency in the horse or ferret by injections of infected ferret spleen (our efforts in this respect have failed), we could use infected dog spleen as antigen and, thereby, obtain an evaluation of the canine virus by means of an antigenic titration.

Table II shows an antigenic titration which is used solely as a rapid method of evaluating the ferret distemper virus. To each tube was added 0.5 cc of physiological saline solution. The dose of complement was 0.2 cc (2 units) and 0.4 cc (4 units). Standard hyperimmune canine distemper antiserum was used in 0.1-cc doses of a 1:5 dilution. The dose of each antigen suspension was 0.1 cc and 1 cc of sensitized cells was added to each tube.

It has been observed repeatedly that when the antigenic unit is 0.1 cc of a 1 per cent suspension, or lower, as is the case in table II, the source of such antigen (infected-ferret spleen) was an animal showing a short incubation period of eight or nine days followed by a moribund condition in another four days. Inferior

TABLE II—*Protocol of an antigenic titration used for the rapid evaluation of ferret distemper virus.*

	UNITS OF COMPLEMENT	ANTIGEN SUSPENSIONS		
		5%	1%	0.5%
Standard.....	2	++++	++++	++++
Serum.....	4	++++	++++	++++
Antigen.....	2	—	—	—
Controls.....	4	—	—	—

Serum control (2 units of complement), negative.
+++ and +++, gradations of fixation.
—, complete hemolysis.

antigens (infected-ferret spleens), that is, those with the titre falling in 5 and 10 per cent suspensions, originate from ferrets showing a prolonged incubation period and a moribund condition that is retarded in its development.

The antigenic titration, therefore, serves only as an indirect means of evaluating dog distemper spleen virus. However, with regard to ferret distemper spleen virus, it affords a fairly accurate qualitative means of standardization. A titre, such as that shown in table II, indicates that the m.l.d. for the same virus will invariably be 1.0 cc of a 1:10,000 dilution, or better.

TEST OF SERUM FOR POTENCY

After numerous trials with various modifications of the serum potency test, using constant doses of the unknown serum and varying quantities of antigen, more uniform results were obtained by using the latter in 20 per cent suspension. A constant working dose of 0.1 cc was adopted. The dose of serum under test varied from 0.1 cc to 0.01 cc of a 1:5 dilution. It was inactivated at 56° C. for 20 minutes to destroy its natural complement. Normal guinea pig serum (complement) was so diluted that a working dose of 1.0 cc contained two units. Five-tenths cc of sensitized cells was used. Either sheep serum or known negative puppy serum was used as a control. In our hands, the former serum has always proved negative. Similar technic, of course, was adopted for the complement and antigenic titrations.

Protocols A and B show a routine test of an unknown serum compared with our standard serum. To meet an adopted standard for potency, the serum under test must show four plus fixation in a dose of at least 0.05 cc of a 1:5 dilution. If the serum from an individual dog falls short of this titre, no difficulty is experienced in raising it to standard potency by more intensive hyperimmunization of the dog.

Serum of such potency has always demonstrated its protective and therapeutic qualities in actual tests on dogs under controlled laboratory conditions. Numerous reports indicate that comparable results are obtained in the field. We have also shown that sera of inferior titre must be used in larger doses.

It would, therefore, appear that there is a close correlation between the protective and therapeutic properties of a serum and its complement-fixing titre.

SUMMARY AND CONCLUSIONS

A constant check on the activity of canine distemper virus can be maintained by titrating it on ferrets. The m.l.d. usually fell

in a 1:10,000 dilution and the ferret, from which such virus was obtained, showed an incubation period of nine days with death occurring in an additional four or five days. Because this observation has been recorded so often over a period of six years, it was concluded that there is a close correlation between the activity of the distemper virus and the incubation period following its injection into the ferret.

As a determination of the m.l.d. of each lot of virus was impracticable, the virus was evaluated roughly by observing the course of the disease in ferrets and correlating the results with

TABLE III—Routine test of an unknown serum compared with standard serum.

PROTOCOL A—Unknown Serum

TUBE	SERUM (1:5 Dil.) (cc)	ANTIGEN (20%) (cc)	COMPLE- MENT (2 UNITS) (cc)	SALINE (cc)	Water-bath, 37.5° C. ½ hr.	SENSI- TIZED CELLS (cc)	Water- BATH 37.5° C. ½ Hr.
1	0.1	0.1	1.0	1.3		0.5	+++++
2	0.07	0.1	1.0	1.3		0.5	+++++
3	0.05	0.1	1.0	1.3		0.5	+++++
4	0.02	0.1	1.0	1.3		0.5	++
5	0.01	0.1	1.0	1.3		0.5	—
6	Serum C (0.1)	—	1.0	1.3		0.5	—
7	Antigen C	0.1	1.0	1.3		0.5	—
8	Hemolytic C	—	1.0	1.5		0.5	—
9	Sen. cells C	—	—	2.5		0.5	Inhibition

PROTOCOL B—Standard Serum

TUBE	SERUM (1:5 Dil.) (cc)	ANTIGEN (20%) (cc)	COMPLE- MENT (2 UNITS) (cc)	SALINE (cc)	Water-bath, 37.5° C. ½ hr.	SENSI- TIZED CELLS (cc)	Water- BATH 37.5° C. ½ Hr.
1	0.1	0.1	1.0	1.3		0.5	+++++
2	0.07	0.1	1.0	1.3		0.5	+++++
3	0.05	0.1	1.0	1.3		0.5	+++++
4	0.02	0.1	1.0	1.3		0.5	++++
5	0.01	0.1	1.0	1.3		0.5	—
6	Serum C (0.1)	—	1.0	1.3		0.5	—
7	Antigen C	0.1	1.0	1.3		0.5	—
8	Hemolytic C	—	1.0	1.5		0.5	—
9	Sen. cells C	—	—	2.5		0.5	Inhibition

++, +++ and +++++, gradations of fixation.

—, complete hemolysis.

the antigenicity of the same virus as shown in the complement-fixation reaction.

The serological test proved to be an accurate means of standardizing hyperimmune distemper antiserum.

The complement-fixing property of hyperimmune distemper antiserum was shown to be specific for ferret distemper virus and that there was a close correlation between the titre of its antibody content and its protective and therapeutic properties.

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- ¹Laidlaw, P. P., and Dunkin, G. W.: Studies in dog distemper. VI. Dog distemper antiserum. *Jour. Comp. Path. & Therap.*, xlv (1931), pp. 1-25.
²Kalmer, J. A.: Serum Diagnosis by Complement-Fixation. (Lea and Febiger, Philadelphia, 1928.)

Dog Poetry Contest for 1935

That 1935 dog poetry contest, sponsored by the Judy Publishing Company, Chicago, Ill., was announced recently, together with the names of the judges who will decide the prize-winning verses when the contest closes, December 31, 1935. The judges are: Bob Becker, outdoors editor of the *Chicago Tribune*; E. Pearl Hess, librarian, and Capt. Will Judy, editor of *Dog World*. The writer of the best poem, in the opinion of the judges, will be awarded \$25. The second prize is \$10, the third prize is \$5, and there are seven additional prizes of \$1 for the honorable-mention poems.

Poems must be addressed to Dog World Annual Dog Poetry Award, Judy Building, 3323 Michigan Blvd., Chicago, and must be received at that address on or before December 31, 1935. Any number of entries may be submitted by one person, but each entry must be original with the contestant and unpublished. All entries must be typewritten and carry the name and address of the contestant on the upper right-hand corner of the first page. Only one poem may be written on a sheet. There are no limitations to the length of the poem or the form of verse. It must, however, be written in English. Winners for 1935 will be announced, with the publication of the winning poems, in the March issue of *Dog World*. The judges will base their awards on the following percentages: technic and poetic ability, 30 per cent; thought and sentiment, 30 per cent; expression and phrasing, 40 per cent.

Entered in the 1934 contest were 991 poems, submitted by 812 contestants, figures that offer definite proof of the ever-growing popularity of the contest.

X-RAYS AS A DIAGNOSTIC AID IN VETERINARY SCIENCE*

By LT. GEORGE TOWNLEY PRICE, JR., V. C., U. S. A.

Fort Sam Houston, Texas

In the years between the announcement of their discovery by Wilhelm Konrad Roentgen, on December 28, 1895, and the present, x-rays have contributed greatly in advancing medical knowledge. In internal medicine, surgery and dentistry these rays have been of very great value as a diagnostic aid, but until recently their importance and value in the practice of veterinary medicine and surgery have been little appreciated. Trained veterinary scientists, unfortunately, have made no concerted effort to apply x-rays in the study and diagnosis of animal pathology. It is the firm conviction, however, of those who have engaged in this work that its importance and value will increase as more experience is gained.

Successful employment of x-rays as a diagnostic aid in veterinary science is dependent upon three equally important essentials: suitable equipment, mastery of technical procedure, and radiographic interpretation.

APPARATUS

X-ray apparatus for the radiography and fluoroscopy of animals must be so designed as to be used conveniently and safely with both small and large animals. Radiography of small animals presents no special difficulty, but experience with large animals has proved that it is easier to transport apparatus to the patient than to bring the patient to the apparatus, and that it is more convenient to move the x-ray tube into alignment than to move the patient. It is therefore a great convenience to possess apparatus that is both portable and flexible.

In the interests of safety, the apparatus must be shock-proof. An unreasoning animal can not be instructed in the dangers of an exposed high-tension circuit, and assistants as well as the patient can be protected only when shock-proof apparatus is used.

If equipment is to be used for radiography of both large and small animals, it must be capable of providing x-ray energy sufficient to complete the exposure within a very short time. Absolute immobility is hard to obtain in animals and the slightest motion during x-ray exposure will reduce the value of the film.

*Presented at the seventy-second annual meeting of the American Veterinary Medical Association, August 27-30, 1935, Oklahoma City, Okla.

The shorter the exposure, therefore, the smaller is the opportunity for motion, and the better will be the result. Apparatus on that account need not be elaborate, nor of exceedingly high capacities, as eminently satisfactory results may be obtained with modest equipment. All practicable radiography may be accomplished with such apparatus, provided high-speed intensifying screens are used.

TECHNICAL PROCEDURE

All the technical procedures for the radiography of animals are modified by particular problems presented by each individual. Radiography of equidae and other large animals presents problems not encountered in radiography of small animals. These problems must be solved by adapting the operating factors to the situation. The operating factors, a manipulation of which permits the greatest flexibility, are time, distance, milliamperage and kilovoltage. It is the skill and dexterity in the manipulation of these important factors, so that the desired result may be realized, that is referred to as technic. The skill required to estimate the problem and decide upon the several factors is acquired only by study and experience.

INTERPRETATION

In common with many other diagnostic agents, x-rays make available information of value only to one trained to interpret the results. The best apparatus and the most skillful technic may have been employed in the production of the x-ray film or radiograph, but the best technical results are of little value unless one has knowledge of that which is observed.

A correct conception of radiography is essential if the radiograph is to be studied properly. Much confusion may be avoided if a radiograph is considered as a projection of a series of shadows of varying densities upon a photographic film. Structures composed of tissues that contain large proportions of inorganic salts offer the greatest resistance to the passage of x-rays and cast the denser shadows. The bones of a region, therefore, appear as heavy white images. Other structures cast shadows of densities depending upon their depth and the resistance of their tissues to the passage of x-rays. The varying grays and blacks in a radiograph form contours which are recognized by the trained observer as the outline of anatomical structures. The intelligent interpretation of a radiograph, therefore, requires a broad knowledge of animal anatomy and physiology. In addition to a knowledge of normal structure and function, interpretation

requires the ability to recognize the normal radiographically so that there may be no doubt of the abnormal or pathological when it is observed. Careful study of radiographs of normal structures will facilitate the correlation of radiographic and anatomical features. After acquiring the skill necessary to recognize the normal, familiarity with the pathological must be acquired.

In the examination of a radiograph for pathology it must be remembered that extensive pathology may exist without any radiographic evidence. When changes are observed they must be translated into pathological terms. This may be accomplished by extracting from the radiograph all available evidence and considering pathology that could provide the changes observed in the tissues affected.

If the interpreter's knowledge of pathological principles is applied in this procedure the diagnosis arrived at is reasonably certain to be correct.

Thus x-rays are an aid to diagnosis only when the radiograph is carefully and intelligently interpreted, and when knowledge of medical principles is applied. The degree of success attained in interpretation will depend upon the faculty of observation, the method of analysis and the ability to translate the shadows into medical terms.

It must be borne in mind that radiology is but one of many diagnostic methods and that it is only by a correlation of the pathological, clinical and radiographic features of the normal and morbid that the best of diagnostic results may be realized.

APPLICATION

The extent to which x-rays may be applied to problems in veterinary medicine and surgery vary, since a greater use of this agent as a diagnostic aid is possible when the patient is a small animal than when it is a large animal. All x-ray practices that have been developed to aid in establishing diagnosis are practicable when the patient is small because of the ease with which it may be controlled and all regions radiographed. When the patient is a large animal, radiography is limited to the extremities as it is impractical to radiograph the thicker regions because of the great tissue depth.

"I say, waiter, there's a fly in my soup."

"Surely not, sir; maybe it's one of those vitamin bees you hear so much about."

PERIODIC OPHTHALMIA*

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Periodic ophthalmia or moon-blindness in horses has been recognized for centuries. Vegetius, one of the first writers on the diseases of animals, described it about the time of the fall of the Roman Empire.

The name "moon-blindness" was selected in early times and has been continued, by laymen especially, up to the present. In an old copy of Markham's Masterpiece, printed in 1650, the author, a noted plagiarist, states that "the moon-eyes or Lunatic-eye, are of all sore eyes the most dangerous and noysome. Now they be called Moone-eyes because if the Farrier doe observe them, hee shall perceive that at some times of the moone, the horse will see very prettily, and at some times of the moone he will see nothing at all."

William Percivall, of England, one of the most celebrated veterinarians of his time, described the disease about 100 years ago under the name of periodic ophthalmia and spoke of the fallacy of ascribing it to influences of the moon. In his well-written article he quotes Hurtel D'Arboval, a celebrated French veterinarian, as saying that "of all the maladies which affect the eyes of the horse periodic ophthalmia is the most common, the most grave, the most obstinate, the most rebellious and the most fatal." Percivall agrees with D'Arboval's statement except that he would say which affects *horse* instead of the eye of horses.

Coleman, previous to Percivall, stated that "the disease is the product of the poisons generated from the effluvia of the breath, dung and urine of horses standing together."

While the disease has a time-honored history and has received much study, it is still without a comprehensive and satisfactory name and much remains for future study regarding its etiology and treatment.

Nicholas, a recent veterinary ophthalmologist, describes it under the title of primary irido-cyclitis. A still better name might be primary uveitis for the reason that not only the iris and ciliary body, but the choroid, as well as the whole uveal tract is eventually involved. As far as the pathological changes are concerned it might be called a panophthalmitis, for all the vital structures of the eye are eventually diseased and destroyed. The

*Presented at the seventy-second annual meeting of the American Veterinary Medical Association, August 27-30, 1935, Oklahoma City, Okla.

objection to naming it panophthalmitis is the fact that it has been customary to reserve this name for acute infections of all structures of the eye, which run a rapid and fatal course, ordinarily resulting from an injury.

Certain writers have suggested that periodic ophthalmia is the glaucoma of horses. Nicholas is probably correct in stating that glaucoma is rare in animals. It has some of the characteristics of periodic ophthalmia. The chief difference between the glaucoma of man and periodic ophthalmia in equines is the fact that in the first condition hypertension frequently, if not always, is present, while in periodic ophthalmia hypotension is present except occasionally in subacute attacks.

The disease is characterized by an inflammation of the various structures of the eye lasting for a few days and then may or may not subside and the eye appear quite normal for a time. Another attack follows in a period varying from a few days to weeks, months, or even years. These attacks usually terminate in total blindness. One or both eyes may be involved at the same time or one may or may not remain normal during the life of the animal.

DISTRIBUTION

The disease evidently is less prevalent now than in former times. It has seldom reached epizootic or panzootic proportions. It is principally sporadic in certain stables, and a number of stables in the same section of the country may harbor the disease.

L. A. Merillat states that it is extremely rare west of the Rocky Mountains. Cameron says it is rare in the Northwest. Not seen in Washington (Wegner). Practically none in Montana (Stevens). Much in central Illinois (Welch). Prevalent in Wisconsin (Ferguson). Very common in the South (Moore). Decidedly common in Tennessee (Bell). Many cases in Ohio and New York (Udall). In Pennsylvania the disease is limited to a few farms in certain localities. The same condition exists in Delaware, Maryland and most of the states in the northeast section of the United States.

In the official History of the World War (Royal Army Veterinary Corps), it is stated that bad centers of periodic ophthalmia, at the time of purchasing remounts for the World War, were located around Chicago, Des Moines and Cedar Rapids. The percentage of those rejected at the time of purchase is not given, but it does state that 3.26 per cent were cast later as a result of defective sight. It was prevalent in the French Army during the World War to the extent of 1.4 per cent of the animal strength.

The disease was introduced into South Africa, during the Boer War in 1899-1901, but was soon checked after the war when horses were placed in sanitary stables. (Theiler)

Some idea of the losses sustained can be obtained from a questionnaire recently sent to a list of gentlemen horse-owners selected at random. Replies were received from 35 owners. Of this number, 16 reported as not having had a case for the past five years. The 19 others, owners of 278 horses, reported a loss of 57 cases during the same time. Ten of those reporting failed to mention the estimated losses but the nine others reported a loss of 23 horses valued at \$20,650.

Dr. L. A. Merillat was one of the first to mention that the disease seldom if ever develops in city stables. This agrees with the observations of the writer and many city practitioners.

A questionnaire was sent to a number of the older veterinarians in several cities in this country, asking if they could recall an outbreak in a city stable. Every reply was negative. Among those reporting as having had trouble with the disease in or near the city in which they practiced are mentioned: Drs. L. A. Merillat, Chicago; E. B. Ackerman, Brooklyn; L. H. Howard, Boston; Charles W. Boyd, Pittsburgh; John P. Turner, Washington, D. C.; William Bell, Nashville; Earl B. Hopper, Ridgewood, N. J.; Hamlet Moore, New Orleans; Hiram T. Gaetz, Buffalo, and H. P. Eves, Wilmington, Del.

It is not unusual for horses to be brought to the city with defective sight. In some cases the defect may be overlooked at the time of purchase. A recurrent or initial attack may appear up to within six months. If so, the subsequent attacks usually are less severe than in country stables where the disease has occurred in other horses.

Dr. E. B. Ackerman states in a letter dated July 20, 1935, as follows:

"While practicing in New York City for 34 years, I had a great many cases of periodic ophthalmia, principally in large business stables, riding clubs and academies, where a number of horses were stabled under the same conditions. Found but few cases in small stables. Lots of the cases in the large stables in the city had come from the country, some as green horses and others from clients who had country estates. So it looks as if much of this trouble was contracted in the country, although I had never thought of it in that way."

Dr. William Bell, of Nashville, Tennessee, states that "after horses were in the city six months or a year they never developed periodic ophthalmia." Stable conditions evidently are a factor in the etiology of the disease.

Dr. H. P. Eves mentions a case near Wilmington, Delaware, where an owner has four farms. The barn on one farm is considered infected with the disease. A number of cases have developed in this barn. No trouble has occurred in the three others. Sanitary conditions, food, water and so forth are excellent on each of the four farms.

There is a farm formerly known as the "blind horse farm," located about ten miles from Philadelphia, in an excellent agricultural section, where the disease was continuously present for years. The barn was a combination bank barn. The floor in the basement stable was concrete. The drainage, light and ventilation were excellent. A good-sized dairy herd was kept in the south end of the stable and four to six horses in the north end. There was a partition between the horses and cattle. Practically every horse ever kept in this stable for from six months to a year developed periodic ophthalmia.

The barn burned about five years ago. A new modern horse stable was built within a few yards of the old barn. The blind horses were moved to the new stable. New horses have been purchased and stabled with the blind ones since. So far none of the new horses have developed the disease. The only change made was from the old to the new barn. Dr. J. Allyn Rogers, the attending veterinarian, and the writer have been familiar with conditions on this farm for more than 20 years. Dr. Rogers believes that the trouble in the old barn was due to dampness. The basement was deep and more like a cellar than a stable. The walls and floor were wet most of the time.

ETIOLOGY

Much valuable research has been done on this disease, especially in the past 35 years. It is not generally considered contagious but many good investigators believe that it may be infectious. What the infective agent is or how it is carried is not known. If infectious, there is probably some predisposing cause that has escaped detection.

A Committee for the Investigation of the Diseases of the Eyes of Horses, composed of a few interested horsemen, veterinarians, an ophthalmologist, a pathologist and a research worker, was organized at the School of Veterinary Medicine, University of Pennsylvania, in the fall of 1934 to make a study of the etiology. The work is being continued. The Committee made the following preliminary report, July 16, 1935, to the subscribers of the fund for conducting the investigation:

Prior to the inception of these studies, it had been fairly well established that soil, climate and food probably lack a definite relation to this disease except as factors modifying susceptibility. However, the disease was known to spread in herds of horses, and experimental infection by inoculation of the eyes of normal horses with fluid taken from the eyes of animals having the disease had been accomplished with sufficient regularity to indicate that these fluids contained the cause of the disease. Opinions as to the nature of the causative agent vary but the best evidence indicates that it is a filtrable virus, that is, it belongs to that class of organisms which also includes the infectious agent of canine distemper and of rabies.

It had been reported also that the eyes of rabbits were susceptible to inoculation with bacteria-free filtrates from eyes of diseased horses, that the disease might be passed in series through rabbits and be reinoculated into horses again producing periodic ophthalmia. This offered the possibility of testing preventive and curative measures on the eyes of rabbits rather than on horses, a very obvious economy.

With these facts as a background, experiments were begun, the results of which will be summarized:

(1) Intraocular injection of filtrates of the fluids and tissues of the eyes of horses having clinical periodic ophthalmia produced disease changes in the eyes of rabbits in approximately one-half of the animals. These changes are sometimes duplicated by intraocular injection of filtrates of normal horse and rabbit eyes.

It was not profitable, therefore, to attempt preventive and curative measures on the eyes of rabbits.

(2) Intraocular injection of bacteria-free filtrates of the eyes of horses having active periodic ophthalmia into the eyes of normal horses produced an attack indistinguishable from periodic ophthalmia of varying severity in 13 to 15 horses.

(3) The experimental disease was passed in series through three groups of horses. In the second group of these, two of three animals developed the disease in both eyes, although only one eye was injected; the attack in the uninjected eye came on about 72 hours after inoculation.

Filtrates of normal horse eyes when inoculated into horses had no ill effects except in one case. In this instance the opposite eye had been injected with material from a diseased eye. This reaction to material from a normal eye may have been due to the development of the disease in both eyes, the response being hastened by the slight injury incident to injection of material from a normal eye. This explanation is supported by the fact that two horses developed the disease in the uninjected eye after a latent period.

It is the desire of the Committee to continue this work for another year in an effort to discover an immunizing agent which will prevent the occurrence of periodic ophthalmia.

SYMPTOMS

The symptoms have been well covered by Percival, Law, Merillat, Guard and others. Veterinarians and good horsemen generally have but little difficulty in recognizing the disease especially after a recurrence of the symptoms. It is difficult and at times not possible to differentiate the origin of the disease

from an inflammation of any structures of the eye due to other causes, even injuries from foreign bodies. The history is of great assistance. When examining horses for soundness, careful attention should be given to any eye lesions such as: lachrymation, photophobia, cloudiness of the cornea, hypopyon, synechia, iritis, cyclitis, cataract, etc. It is not unusual to find a horse totally blind in one eye from cataract or amaurosis and the owner may or may not know it.

Uveitis often terminates in cataract. There are several varieties. They may occur as a result of various causes. It is probable that most of the cataracts in horses are the result of periodic ophthalmia.

Irido-cyclitis or uveitis may result from influenza and may or may not terminate in blindness, depending a great deal upon the treatment. It may also result from strangles, glanders, focal infections, traumatisms, etc. Such attacks may be relapsing. One seldom has difficulty in differentiating an irido-cyclitis due to the above causes from periodic ophthalmia by the general symptoms and especially where a reliable history is obtainable. The most reliable symptom of periodic ophthalmia is the recurrence of acute attacks.

The ophthalmoscope is of much assistance in diagnosing defects of the eye. Without an intelligent and general use of this valuable instrument one is much handicapped in detecting lesions that are vastly important.

TREATMENT

Until the real cause of periodic ophthalmia is determined, the treatment will remain more or less empirical. Nothing can be done to restore to normal, structures of the eye that have been destroyed. After three or four attacks have occurred, the animal will probably become blind in spite of any medical assistance. Treatment should begin with the first attack. Even then no assurance can be given that a permanent cure will be obtained.

One should not be too pessimistic regarding the treatment especially when begun early in the attacks. If cases could be hospitalized and properly treated in accordance with the principles now available, it is believed that many cases could be cured. Judging from reports received from a number of reliable practitioners, cures of such cases are not unusual. One may not be able to differentiate real periodic ophthalmia from uveitis or keratitis due to influenza, strangles, foreign bodies, etc. The general treatment is the same, whatever the cause.

The treatment for periodic ophthalmia should be hygienic and medical, both local and general.

The writer believes that radical changes must be made in stables where the disease is sporadic. In those constructed of stone or brick and concrete it is often difficult or impossible to control moisture even though light, ventilation and drainage are considered good. In many such stables where the disease has occurred, the ventilation, light and drainage are good but moisture cannot be controlled. The prospects of curing cases that develop and are kept in such stables is decidedly bad. Wonderful improvement has been made in the past few years in stable construction and sanitation for cattle. This has been a great help in ridding herds of tuberculosis, Bang's disease, etc.

Horsemen as a class are lagging far behind the dairymen in stable sanitation. Less attention is apparently given this subject now than was shown in pre-automobile days.

A few horsemen have stated that some of their cases had developed at pasture. It is doubtful whether this is true. The writer believes that such cases may have been through the initial attacks, possibly not observed, while in the stable and turning to pasture will not prevent future attacks.

Aside from sanitation careful consideration should be given to the food and water supply.

Dairymen and poultrymen have made remarkable progress in feeds and feeding in recent times, while horsemen have followed the methods of feeding adopted by their forefathers.

It remains to be proven what influence, if any, heredity may play in propagating the disease. This possibility is nearly as old as the moon theory of its cause. Many still believe it bad policy to breed a stallion or mare that is in the acute stage of the disease or even one that has become blind as a result of the disease. If heredity is a factor which predisposes to the disease, there are many exceptions available.

The conformation of the eye gives but little evidence that a future attack of periodic ophthalmia may be expected. Pig-eyed horses were looked upon with suspicion, but one may find the disease equally as frequent in those with prominent, well-formed eyes.

Horses may develop periodic ophthalmia when kept in stables where the disease has occurred. There is not much danger of spreading the disease to other horses by moving those that have developed the disease into stables that have been free from it.

There is no remedy known, either medicinal or biological, that will prevent the disease. While we have no specific cure for the disease, there are many methods available that should be used.

One mistake too often made is to keep on working a horse, with or without treatment, through one attack after another. A sick or lame horse is usually kept from work and treated, yet there is less danger ordinarily of its becoming worthless or losing a foot or leg than there is that one with a diseased eye will become blind.

Lachrymation and photophobia are among the first symptoms. At this time the animal should not be worked. Strong light should be avoided. The eye should be bathed frequently with a suitable collyrium such as boric acid or sulfate of zinc solution, to which may be added cocaine or procaine to alleviate the pain.

A mild ointment, such as boric acid, iodoform or yellow oxide of mercury, may be applied to the eyelids to prevent irritation from the dried exudate that will adhere to them and cause irritation to the conjunctiva and cornea.

A mydriatic is decidedly useful to prevent or control anterior or posterior synechia. A 1 per cent atropine solution, applied with sufficient frequency to keep the pupil well dilated, should be used. In mild cases a few drops instilled once in 3 or 4 days will be enough. The chances of a cure are decidedly bad when the pupil fails to react to a mydriatic. Treatment beyond this point is more or less experimental.

An injection of one to two drams of Lugol's solution deep into the extra-orbital fat has been used by Wiggs,¹ Chambers,² Avery³ and others, with some degree of success. Injections of sterilized skim milk have been recommended. The principle may be sound, but the results are decidedly questionable.

A few practitioners are still using salvarsan or neoarsphenamine. Both have been used by the writer with no success. The results obtained by Guard and reported in the *Veterinary Practitioners' Bulletin* (Ames, Iowa) correspond with the experience of most practitioners who have used these arsenical preparations.

In conclusion the writer agrees with the statement made by Guard that "we should carefully study the condition of the soil, drainage, sanitary conditions and systems of management of the various stables and sections where the disease is prevalent and note their possible relation, if any, to the existence of the disease."

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BANG'S DISEASE CONTROL IN STATE INSTITUTION HERDS*

III and IV. Progress Reports on the 16 Herds for 1931 and 1932

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This report considers, on an annual basis by calendar years, the Bang's disease control work in the herds owned by Pennsylvania state institutions and covers a two-year period (1931-1932). It has been prepared as reports III and IV, for the reason that only two previous reports have been published.

The first report¹ was presented at the 1929 convention of the American Veterinary Medical Association, at Detroit, Mich. It covered the foundation work in the state institution herds, obstacles encountered, a summary of the results in herds under consideration at that time, and contained some concluding statements. It showed the estimated comparative costs of Bang's disease positive and negative animals based upon calf and milk production. The data covering the milk and calving records were compiled on a yearly basis as cow producing years because this seemed to present the most practical method to study them collectively. The herds were studied as a whole, rather than on the basis of individual animals, and the data were not considered on an annual basis.

The second report² was presented at the 1931 meeting of the Pennsylvania State Veterinary Medical Association, at Harrisburg, Pa. It contained a discussion of the work and a summary of the results obtained in 14 institution herds up to the end of the year 1930, and dealt mainly with the breeding efficiency of Bang's disease-free cattle. The data in the second report were compiled after making a study of the record cards of individual cows. Animals which had not given birth to a second calf, with a few exceptions, were not included. The number of months charged to each cow was computed as the time between the first service date and the date of delivery of the last calf. The summary chart in the second report was completed to January 1, 1931, on all cows in the herds at that time except cows in the first-calf group.

The present reports (III and IV) describe the continued progress of Bang's disease control work in herds owned by Pennsylvania state institutions, but includes more herds than the two previous reports. The practice of pasture breeding had been dis-

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continued; therefore, breeding data were computed on the basis of the total number of months required for each cow, including the first-calf group, to freshen within the year. Calf intervals have been computed by charging the herd with the number of months between freshenings. The bull services charged against cows are based on those which were required to produce the calves born within the year.

It is not deemed necessary to furnish detailed tables on each individual herd, for the reason that details were covered in previous reports, and the data in this report have therefore been compiled in the form of summary tables.

Alphabetical designations used to identify the herds discussed in reports I and II were as follows: A, Morganza; B, Warren; C, Laurelton; D, Danville; E, Muncy; F, Torrance; G, Polk; H, Huntingdon; I, Wernersville; J, Rockview. Additional herds included in this report are: Allentown, Fairview, Harrisburg, Norristown, Pennhurst and Selinsgrove.

Table I contains the 1931 summary and shows that 572 cows freshened in the 16 herds, requiring a total of 7,441 months from the last freshening dates and representing an average of 13.18 months between freshenings. Services required totaled 818, or an average of 1.43 services for each freshening. Twins were counted as one freshening. An occasional service was made after the cows were bred and usually happened at about the fifth month of pregnancy. Heifers freshening for the first time are not included in table I.

TABLE I—Summary of record of 16 herds for 1931.

HERD	COWS FRESHENED	TOTAL MONTHS	AVERAGE INTERVAL (MONTHS)	BULL SERVICES	
				TOTAL	AVERAGE
Allentown.....	22	289	13.13	30	1.3
Danville.....	57	800	14.03	82	1.4
Fairview.....	19	264	13.9	20	1.05
Harrisburg.....	6	91	15.16	9	1.5
Norristown.....	13	158	12.15	14	1.07
Torrance.....	18	239	13.20	33	1.8
Warren.....	46	640	13.91	65	1.4
Wernersville.....	49	621	12.69	75	1.5
Huntingdon.....	40	466	11.65	60	1.5
Morganza.....	31	392	12.64	51	1.6
Muncy.....	19	216	11.4	22	1.1
Rockview.....	55	684	12.45	83	1.5
Laurelton.....	17	249	14.60	23	1.3
Pennhurst.....	72	946	13.14	86	1.19
Polk.....	96	1232	12.94	131	1.36
Selinsgrove.....	12	144	12.00	34	2.8
Total.....	572	7441	13.18	818	1.43

Table II contains a record of the same cows as table I, but it is presented in accordance with the number of gestation periods through which the different groups of cows have passed, the first-calf group being added. A total of 812 females gave birth to calves in 1931, in a total of 9,703 months, or an average of a calf each 11.9 months. The number of services required was 1,105, or an average of 1.3 services for each calf. Cows numbering 572, which had freshened two or more times, again freshened during 1931, in a total of 7,441 months, or an average of 13.18 months. Services required totaled 818, or an average of 1.43 services for each calf born. During 1931, 240 heifers (29 per cent of the total number of cows) freshened in 2,262 months, producing a calf each 9.4 months. These heifers required 287 services, or an average of 1.19 services for each calf born.

The results recorded in table II indicate, from the standpoint of the number of services required, that the breeding efficiency is not influenced by the age of the cow, or the number of gestation periods through which she has passed. It should be borne in mind that culling eliminates many of the older cows which are no longer useful as dairy animals. In most cases, causes other than failure to breed were responsible for their elimination. It should be remembered also that these herds were free from Bang's disease except as shown in this report.

TABLE II—Summary of gestation periods in 16 herds for 1931.

GESTATION PERIODS	COWS	MONTHS	AVERAGE	BULL SERVICES	
				TOTAL	AVERAGE
8 or more.....	22	292	13.27	29	1.3
7.....	9	108	12.00	9	1.
6.....	40	509	12.72	47	1.1
5.....	54	714	13.22	91	1.6
4.....	87	1127	12.95	131	1.5
3.....	158	1985	12.56	208	1.3
2.....	202	2696	13.34	303	1.5
Total.....	572	7441	13.18	818	1.43
1st calf group...	240	2262	9.4	287	1.19
Total.....	812	9703	11.9	1105	1.3

Table III represents all cows, including first-calf heifers, which freshened during 1931; the abortions which occurred from causes other than Bang's disease and the percentage of abortions in each herd; the number of cows which did not freshen within the year, and those which died or were slaughtered. The cow and bred heifer population on January 1, 1931, was 1,089. Of this number,

812 (73 per cent) cows and heifers freshened, of which 23 (2.78 per cent) aborted. A total of 84 (7.7 per cent) cows did not freshen within the year, while 193 (17.5 per cent) cows were removed, 25 by death and 168 by slaughter. The 240 heifers which freshened during the year represented 22 per cent of the cow population.

TABLE III—Summary of records of all cows, including first-calf heifers, for 1931.

HERD	COWS FRESH- ENED	ABORTIONS		COWS NOT FRESH 1931	REMOVALS	
		No.	PER CENT		SLAUGHT- ERED	DIED
Allentown.....	50	1	2.0	12	17	4
Danville.....	66	0	0.0	14	12	1
Fairview.....	27	0	0.0	3	10	0
Harrisburg.....	12	0	0.0	5	2	2
Norristown.....	23	1	4.3	0	4	1
Torrance.....	34	0	0.0	4	11	0
Warren.....	78	6	7.6	6	15	2
Wernersville....	64	1	1.5	1	7	1
Huntingdon.....	43	3	6.9	13	5	0
Morganza.....	32	3	9.4	5	25	3
Muncy.....	25	1	4.0	5	22	2
Rockview.....	82	0	0.0	0	6	4
Laurelton.....	27	0	0.0	8	10	1
Pennhurst.....	102	5	4.9	3	9	0
Polk.....	127	2	1.6	2	5	0
Selinsgrove.....	20	0	0.0	3	18	4
Total.....	812	23	2.78	84	168	25

The cows in two herds required more than the average number of services. The fact that in one herd only one bull was available for service the greater part of the year, and in the other an old proved sire only approximately 50 per cent efficient was used, accounted for the higher average number of services in these two herds.

ONE HERD BECAME REINFECTED

Investigation disclosed the possibility, in the Morganza herd, of pasture exposure, during the spring of 1931, of the mature animals of the herd to infected animals in untested neighboring herds. At least, this was known to have happened. This herd was certified and all tests had shown negative results regularly until, as the result of a test, on March 26, 1931, of the entire herd consisting of 84 animals, a bull showed a somewhat characteristic "suspicious" reaction and a retest was advised. The results are

recorded in table IV. The dam of this bull had been negative to repeated blood-tests for Bang's disease.

TABLE IV—Results of blood-tests of a suspiciously reacting bull.

BULL	DATE OF TEST	DILUTIONS			
		1:25	1:50	1:100	1:200
Pa. T. S. Telivo. Born 2-10-29	4-26-31	+3	+3	+1	+1
	4- 6-31	+4	+3	+1	—
	5- 1-31				
		Slaughtered. Not retested			

The following cows were bred to the Telivo bull:

Cow 356 was bred on December 22, 1930, and gave birth to a normal female calf (532) on November 30, 1931. The cow died October 8, 1932.

Cow 495 was bred on January 1, February 2 and February 20, 1931. On November 15, 1931, she gave birth to a bull calf which was slaughtered for veal. This cow reacted to the blood-test first on October 13, 1931, and on later dates. It is not claimed that her reactions were caused by the bull.

Cow 390 was bred on January 12, 1931, and gave birth to a normal calf on October 19, 1931. She showed slightly suspicious reactions on October 13 and October 24, 1931, and later was negative. She was slaughtered, April 25, 1933.

The relationship of the Telivo bull, if any, to reinfection of this herd is not known. The exposure of the herd may have taken place either before or after the time of his suspicious reaction. On June 2, 1931, the entire herd consisting of 83 animals was tested, and all animals were negative.

Cow 438 aborted in the pasture on July 16, 1931, and was slightly suspicious to the blood-test from blood collected on the same day the abortion occurred. She was tested again on August 10, 1931, and gave a highly suspicious to positive result. This cow was a daughter of a cow obtained from a Bang's disease-free herd. She freshened as a heifer at full time on October 18, 1930, and showed negative results to the blood-tests until after she aborted on July 16, 1931. Her blood-test results are shown in table V.

TABLE V—Results of blood-tests of a suspiciously reacting cow.

COW	DATE OF TEST	DILUTIONS			
		1:25	1:50	1:100	1:200
438	7-16-31*	+3	+2	—	—
	8-10-31	+4	+4	+2	+1
	8-25-31				
		Slaughtered			

*The cow also aborted on this date, but the fetus was not examined.

A total of 83 animals, representing the entire herd, underwent tests on October 5, 1931, and frequent tests were made on subsequent dates. Animals, identified by herd number, which showed positive or suspicious reactions, are recorded in table VI. All of the animals which became reactors were removed from the herd and placed in quarantine as soon as reports of the results of the tests were received. Data are reported for these animals beyond the 1932 calendar period covered by this report; that is, records showing the final disposal of these animals are included.

The Morganza herd consisted of 84 animals at the time the reinfection occurred, less two positive calves which later became negative, and two that were removed for other reasons, leaving a remainder of 80 animals.

Frequent tests were made during the two-year period, 1931 to 1933 inclusive. All animals which reacted to the test (dilutions 1:25, 1:50, 1:100, 1:200) in any degree whatsoever, except one slightly suspicious animal, are shown in table VI. Results on all except two positive calves are shown in the following summary:

Total showing a reaction.....	40	(50 per cent of the 80)
First reaction positive.....	13	(32.5 per cent of the 40)
First reaction highly suspicious.....	5	(12.5 per cent of the 40)
First reaction slightly suspicious.....	22	(55 per cent of the 40)

Of the five highly suspicious animals, one was slaughtered, leaving four. Of the 22 slightly suspicious animals, one was slaughtered and three later became highly suspicious and were slaughtered, leaving 18. These four, no doubt, would have been positive had later tests been made. Of the 13 giving positive reactions, all (100 per cent) remained positive. Of the four highly suspicious animals, three (75 per cent) later became positive, while one (25 per cent) later became negative. Of the 18 slightly suspicious animals, 14 (77.7 per cent) later became positive, while four (22.3 per cent) later became negative or remained only slightly suspicious. Of the 22 highly and slightly suspicious animals, 17 (77 per cent) later became positive, while five (23 per cent) later became negative or remained only slightly suspicious.

A further study will show that of the 40 animals which reacted:

- 7 were unbred virgin heifers;
- 2 suspicious animals were slaughtered before a calving record was available;
- 3 suspicious animals returned to negative and there were no calving records during the period of the reactions;
- 6 mature animals were not pregnant during the period of the reactions;

TABLE VI—Results of blood-tests of positively or suspiciously reacting cows.

Cow	DATE OF TEST	DILUTIONS			
		1:25	1:50	1:100	1:200
373 Born 10-20-22	10-18-30	Calved			
	5-29-31	Bred			
	10- 5-31	+2	—	—	—
	10-15-31	—	—	—	—
	11-28-31	+2	+1	—	—
	12-13-31	+2	+1	—	—
	12-31-31	+2	+1	—	—
	1-10-32	Aborted.	Not rebred.	Fetus not examined	
	4- 6-32	+2	—	—	—
	5- 2-32	+2	+1	—	—
	11-24-33	Slaughtered			
382 Born 9-18-26	2-27-31	Calved.	Not rebred		
	10- 5-31	+4	+4	+2	—
	10-15-31	+4	+4	+4	+1
	11- 3-31	+4	+4	+4	+4
	Jan. 1932	Slaughtered			
390	10- 5-31	+3	+2	—	—
	10-15-31	+2	+1	—	—
		Negative since			
428 Born 3-22-25	12-28-30	Calved			
	4- 1-31	Bred			
	10- 5-31	+4	+4	—	—
	10-15-31	+4	+3	—	—
	11- 3-31	+4	+4	+4	+1
	1-11-32	Normal calf.	Not rebred		
	4- 6-32	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
	10-13-33	Slaughtered			
444 Born 7-20-28	10- 5-31	+2	—	—	—
	10-15-31	—	—	—	—
	11- 3-31	+2	+1	—	—
	11-27-31	Slaughtered. conceived	Bred many times.	Never	
482 Born 8-3-26	9- 6-30	Calved			
	1-12-31	Bred			
	9-23-31	Aborted.	Not rebred.	Fetus not examined	
	10- 5-31	+4	+4	+4	+4
	10-15-31	+4	+4	+4	+4
	11- 3-31	+4	+4	+4	+4
	4- 6-32	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
	12- 1-33	Slaughtered			

TABLE VI—Results of blood-tests of positively or suspiciously reacting cows—Continued.

Cow	DATE OF TEST	DILUTIONS			
		1:25	1:50	1:100	1:200
486 Born 4-20-26	4- 8-31	Calved			
	6-21-31	Bred			
	10- 5-31	+2	+1	—	—
	10-15-31	+2	+1	—	—
	11- 3-31	+2	—	—	—
	11-28-31	+3	+2	—	—
	12-13-31	+3	+3	—	—
	12-31-31	+4	+4	+1	—
	1-12-32	+4	+4	+4	+4
	1-23-32	Aborted. Not rebred. Fetus not examined			
	4- 6-32	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
	12- 8-33	Slaughtered			
487	10- 5-31	+4	+2	—	—
	10-15-31	+2	—	—	—
	11- 3-31	+1	+1	—	—
	Negative since				
495 Born 6-18-27	2-20-31	Bred			
	10- 5-31	+4	+4	+4	+4
	10-15-31	+4	+4	+4	+4
	11- 3-31	+4	+4	+4	+4
	11-15-31	Calved. Not rebred			
	4- 6-32	+4	+4	+4	+4
	11-18-32	Slaughtered			
496 Born 3-13-28	6-18-31	Calved			
	7-12-31	Bred			
	10- 5-31	+4	+4	+4	+1
	10-15-31	+4	+4	+2	—
	11- 3-31	+4	+4	+4	—
	2- 3-32	Aborted. Not rebred. Fetus not examined			
	4- 6-32	+4	+4	+4	—
	2-17-33	Slaughtered			
498 Born 2-3-27	7-15-31	Calved			
	8-17-31	Bred			
	9- 5-31	Bred. Did not conceive. Not rebred			
	10- 5-31	+4	+4	+4	+4
	10-15-31	+4	+4	+4	+4
	11- 3-31	+4	+4	+4	+4
	5-11-32	Slaughtered			
505 Born 1-24-30 (Dam 495)	10- 5-31	+4	+4	+4	+4
	11- 3-31	+4	+4	+4	+2
	12-11-31	Slaughtered			
	Never bred				
427 Born 3-17-25	11- 3-31	+2	+1	—	—
	11-28-31	+4	+4	+4	+4
	4- 6-32	+4	+4	+4	+4
	4-13-32	Calved (No. 541). Not rebred			
	2- 7-33	+4	+4	+4	+4
	11-24-33	Slaughtered			

TABLE VI—Results of blood-tests of positively or suspiciously reacting cows—Continued.

Cow	DATE OF TEST	DILUTIONS			
		1:25	1:50	1:100	1:200
450 Born 9-14-28	9-16-31	Calved. Not rebred			
	11- 3-31	+4	+4	+3	—
	11-28-31	+4	+4	+2	—
	12-13-31	+4	+4	+4	+1
	4- 6-32	+4	+4	+2	—
	5- 2-32	+4	+4	—	—
	2-27-33	+4	+4	+4	+4
	12- 8-33	Slaughtered			
481 Born 8-3-26	8- 4-31	Bred			
	11- 3-31	+3	+1	—	—
	11-28-31	+4	+4	+1	—
	12-13-31	+4	+2	+1	—
	1-12-32	+4	+2	+2	—
	3-14-32	Aborted. Not rebred. Fetus not examined			
	4- 6-32	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
494 Born 11-10-29	8- 8-33	Slaughtered			
	4-30-31	Bred			
	11- 3-31	+4	+4	+4	+1
	12-13-31	Aborted. Fetus not examined			
	4- 6-32	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
	2-27-33	Slaughtered			
429	11-28-31	+3	+2	—	—
	12-13-31	+3	+2	—	—
	12-31-31	+3	+1	—	—
	1-22-32	+3	+2	—	—
	1-23-32	Aborted. Fetus not examined			
	1-25-32	+3	+2	—	—
	2-10-32	+2	—	—	—
	2-29-32	+2	—	—	—
	3-14-32	+2	—	—	—
	3-29-32	+2	—	—	—
	4-13-32	—	—	—	—
		Negative since			
473 Born 6-26-29	6-23-31	Bred			
	11-28-31	+4	+4	+1	—
	12-13-31	+4	+4	+4	+3
	1-12-32	+4	+4	+4	+4
	1-25-32	Aborted. Not rebred. Fetus not examined			
	2-27-32	+4	+4	+4	—
	4- 6-32	+4	+4	+4	+4
	11- 3-33	Slaughtered			

TABLE VI—Results of blood-tests of positively or suspiciously reacting cows—Continued.

Cow	DATE OF TEST	DILUTIONS			
		1:25	1:50	1:100	1:200
525 Born 2-27-31 (Dam 382)	11-28-31	+2	+1	—	—
	12-13-31	+2	+1	—	—
	12-31-31	+3	+1	—	—
	1-12-32	+4	+3	—	—
	1-25-32	+4	+4	+4	+1
	Jan. 1932	Slaughtered. Never bred			
479 Born 9-11-29	3-23-31	Bred			
	12-24-31	Calved			
	12-31-31	+2	—	—	—
	1-12-32	+4	+4	+4	+4
	4- 6-32	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
512 Born 7-19-30	12-31-31	+4	+4	+4	—
	1-29-32	Slaughtered			
		Never bred			
470 Born 6-21-29	1-25-32	+3	+1	—	—
	2- 7-32	Calved.	Not rebred		
	2-10-32	+4	+3	—	—
	2-29-32	+4	+4	+4	+3
	4- 6-32	+4	+4	+4	+4
	10-10-32	Slaughtered			
476 Born 7-26-29	1-25-32	+4	+4	+1	—
	2-10-32	+4	+4	+2	—
	2-29-32	+4	+4	+4	+4
	4- 6-32	+4	+4	+4	+4
	4-18-32	Calved.	Not rebred		
	2-27-33	+4	+4	+4	+4
511 Born 7-4-30	11- 3-33	Slaughtered			
	1-25-32	+3	+2	—	—
	2-10-32	+3	+2	—	—
	2-29-32	+4	+4	+2	+2
	3-14-32	+4	+4	+4	+4
	4- 1-32	Slaughtered. Never bred			
538 Born 2-7-32 (Dam 470)	2-10-32	+4	+4	+2	—
	2-29-32	+2	+2	—	—
	3-14-32	+1	+1	—	—
	3-29-32	—	—	—	—
	8-27-33	Negative since			
	5- 3-34	Bred			
	7-15-34	Calved			
		Bred			

TABLE VI—Results of blood-tests of positively or suspiciously reacting cows—Continued.

Cow	DATE OF TEST	DILUTIONS			
		1:25	1:50	1:100	1:200
488 Born 5-3-25	6-20-31	Calved			
	7-30-31	Bred			
	8- 1-31	Bred. Did not conceive. Not rebred			
	2-29-32	+2	+2	—	—
	3- 9-32	+2	+1	—	—
	3-14-32	+4	+4	+1	—
	3-29-32	+4	+2	—	—
	4- 6-32	+3	+2	—	—
	4-13-32	+3	+2	—	—
	5- 2-32	+1	+1	—	—
	6-20-32	—	—	—	—
	2-27-33	+4	+4	+1	—
	11- 3-33	Slaughtered			
508 Born 3-1-30	2-29-32	+3	+1	—	—
	3-14-32	+3	+2	—	—
	3-29-32	+4	+4	+1	—
	4-13-32	+3	+3	+3	+2
	5- 2-32	+4	+4	+4	+3
	June 1932	Slaughtered. Never bred			
514 Born 10-31-30	3-14-32	+2	+1	—	—
	3-29-32	+4	+4	+1	—
	4-13-32	+3	+3	+2	+1
	5- 2-32	+4	+4	+4	+3
	May 1932	Slaughtered. Never bred			
398 Born 7-6-27	6-14-31	Bred			
	1-23-32	Aborted. Not rebred. Fetus not examined			
	4- 4-32	+2	+2	—	—
	4-13-32	+3	+3	+1	—
	5- 2-32	+4	+4	—	—
	5-23-32	+3	+2	—	—
	2- 3-33	Slaughtered			
541 Born 4-13-32 (Dam 427)	5- 2-32	+4	+4	+4	+4
	5-23-32	+4	+4	+4	+4
	6-20-32	+4	+4	+4	+4
	7-28-32	+4	+4	+4	+4
	9-29-32	+2	—	—	—
	10-21-32	—	—	—	—
		Negative since			
		Calved premature calf			
	1934	Bred			
	8-30-34	Aborted. Fetus negative (L. S. No. 86051)			
	1- 7-35				
513 Born 10-18-30	7-28-32	+3	+2	—	—
	8-31-32	+3	+3	+2	+1
	12-30-32	+4	+4	+2	+1
	2- 3-33	Slaughtered. Never bred			

TABLE VI—Results of blood-tests of positively or suspiciously reacting cows—Concluded.

Cow	DATE OF TEST	DILUTIONS			
		1:25	1:50	1:100	1:200
355 Born 4-25-25	7- 4-32	Calved			
	10-21-32	+3	+2	—	—
	10-30-32	Bred			
	12-30-32	+2	+2	—	—
	1-25-33	+4	+3	—	—
	2-27-33	+4	+1	—	—
	5-25-33	Aborted. Not rebred. Fetus not examined			
	12-21-33	Slaughtered			
509 Born 5-19-30	8- 3-32	Bred			
	12-30-32	+1	+1	—	—
	1-25-33	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
	4- 7-33	Aborted. Not rebred. Fetus not examined			
	12-21-33	Slaughtered			
519 Born 1-20-31	7-21-32	Bred			
	12-30-32	+1	+1	—	—
	1-25-33	+4	+4	+4	+4
	2-19-33	Aborted. Not rebred. Fetus not examined			
	2-27-33	+4	+4	+4	+4
	12-15-33	Slaughtered			
524 Born 2-25-31	12- 2-32	Bred			
	1-17-33	Bred			
	12-30-32	+2	+2	—	—
	1-25-33	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
	4-20-33	Slaughtered			
426 Born 11-9-22	10-31-32	Calved. Not rebred			
	2- 8-33	+4	+4	+4	+4
	2-27-33	+4	+4	+4	+4
	12- 1-33	Slaughtered			
510 Born 6-1-30	2-10-32	Bred			
	8-29-32	—	—	—	—
	9- 7-32	Aborted. Not rebred. Cultures from fetus and guinea pig inoculation positive			
	2-27-33	+4	+4	+4	+4
	12-15-33	Slaughtered			
501 Born 12-8-29	8- 6-32	Bred			
	3-30-33	+4	+4	+4	+4
	4- 6-33	Aborted. Not rebred			
	12-15-33	Slaughtered			
523 Born 2-13-31	10-17-32	Bred			
	3-30-33	+4	+4	+2	—
	4-20-33	Slaughtered			

1 slightly suspicious animal became positive and was slaughtered before a calving record was available.

19 animals accounted for. This leaves 21, of which:

6 (28.6 per cent) calved at full time;

15 (71.4 per cent) aborted immediately before or after showing a reaction.

Table VII records the order of the animals which aborted. The results should impress upon the reader the importance of reactions in the lower dilutions, especially when dealing with a herd which has become reinfected after once having been Bang's disease-free. It should be observed also that a very high percentage of reactions in the 1:25 and 1:50 dilutions, in any degree, especially in a reinfected herd, belong in the *positive* range and not in the *negative* range.

TABLE VII—Record of the order of 15 aborting animals.

REACTIONS	ANIMALS
Ab-P.....	2
P-Ab.....	3
HS-P-Ab.....	1
C-SS-Bred—SS-HS-Ab-Slaughtered.....	1
Ab-SS-HS-Slaughtered.....	1
SS-Ab-SS-N.....	2
Ab-SS-P.....	1
SS-P-Ab.....	2
SS-HS-P-Ab.....	1
SS-HS-Ab-P.....	1
Total.....	15

Key: Ab = Aborted. P = Positive; complete agglutination in the 1:50 dilution and at least a +2 in the 1:100 or higher dilutions. HS = Highly suspicious; complete agglutination in either or both of the 1:25 and 1:50 dilutions. C = Calved full time. SS = Slightly suspicious; partial agglutination in either or both of the 1:25 and 1:50 dilutions. N = Negative; no agglutination in any dilution.

Table VIII contains the summary for 1932, and shows that 712 cows freshened in the 16 herds, requiring 9,155 months from their last freshening to the 1932 calving dates, or an average of 12.85 months between freshening dates. Services required numbered 1,161, or an average of 1.47 services for each cow that was bred. Twins were counted as one freshening.

As reported in the services required for 1931, the same may be said for a few of the herds requiring a high percentage of services per calf for 1932. This again was on account of using inefficient herd sires. This information is brought to our attention only by a review of the service records. The use of such a herd sire for several months makes a very noticeable difference

TABLE VIII—Summary of record of 16 herds for 1932.

HERDS	COWS FRESHENED	TOTAL MONTHS	AVERAGE INTERVAL (MONTHS)	BULL SERVICES	
				TOTAL	AVERAGE
Allentown.....	47	636	13.32	82	1.7
Danville.....	62	868	14.00	85	1.3
Fairview.....	24	330	13.75	45	1.8
Harrisburg.....	23	330	14.35	53	2.3
Norristown.....	20	247	12.35	29	1.4
Torrance.....	30	409	13.60	76	2.5
Warren.....	84	1093	13.01	107	1.2
Wernersville.....	46	569	12.37	81	1.7
Huntingdon.....	41	538	13.11	75	1.7
Morganza.....	20	269	13.45	52	2.6
Muncy.....	23	278	12.09	31	1.3
Rockview.....	76	929	12.49	111	1.4
Laurelton.....	24	323	13.46	37	1.5
Pennhurst.....	76	923	12.14	115	1.5
Polk.....	99	1244	12.56	159	1.6
Selinsgrove.....	17	199	11.70	23	1.3
Total.....	712	9155	12.85	1161	1.47

during a year in the average number of services required by cows bred to him, as well as the calving interval. Likewise, cows are occasionally re-served in herds after conception. Note that in three herds, more than two services were required per calf. In the Harrisburg herd, 20 cows in 1932 required three or more services. This herd experienced considerable vaginitis which was believed responsible for the high average number of services. The Morganza herd had eight cows requiring three or more services per calf.

Table IX contains a record of the same cows as table VIII, but it is presented in accordance with the number of gestation periods through which the different groups of cows have passed, the first-calf group being added. The summary shows that 948 females freshened in 1932, in a total of 11,479 months, or an average of 12.1 months to each freshening. Services required totaled 1,558, or an average of 1.6 services for each calf. The record shows further that 712 cows that had freshened two or more times again freshened in 1932, in a total of 9,184 months, or an average of 12.9 months. They required 1,160 services, or an average of 1.6 services for each calf. During the same time, 236 heifers, or approximately 24 per cent of the total number of cows that freshened during the year, freshened in 2,295 months, producing a calf each 9.7 months and requiring 398 services, or an average of 1.6 services for each calf born.

TABLE IX—*Summary of gestation periods in 16 herds in 1932.*

GESTATION PERIODS	COWS	MONTHS	AVERAGE	BULL SERVICES	
				TOTAL	AVERAGE
8 or more.....	15	192	12.8	27	1.8
7.....	21	263	12.5	33	1.5
6.....	51	669	13.1	89	1.7
5.....	73	921	12.6	114	1.5
4.....	144	1855	12.8	227	1.2
3.....	172	2224	12.9	272	1.5
2.....	236	3060	12.9	398	1.6
Total.....	712	9184	12.9	1160	1.6
1st calf group....	236	2295	9.7	398	1.6
Total.....	948	11479	12.1	1558	1.6

In table X, the summaries and totals for 1932 are given of all cows that freshened, including first-calf heifers; abortions from causes other than Bang's disease; the number of cows that did not freshen during the year, and those that died or were slaughtered. These totals show that the cow and bred heifer population on January 1, 1932, was 1,219; that 948 (77.7 per cent) cows and heifers freshened, of which 21 (2.3 per cent) aborted; that 77 (6.3 per cent) cows in the herds did not freshen; that 194 (15.9 per cent) cows were removed, of which 23 cows died and 171 were slaughtered. The 236 heifers which freshened during the year represented 19 per cent of the cow population.

DISCUSSION

The management of any herd plays an essential part in its breeding efficiency. Any herdsman supervising the breeding of a herd of 50 or more females should make use of a system of recording the freshening dates of animals and keeping them calendared for daily observation, until they are known to be safely in calf, either by personal observation or veterinary examination. We are at present advising that all animals freshen in maternity stalls where they should remain for two or more weeks before being returned to the milking herd. When a fresh cow is returned to the milking herd, she should be identified as an open (unbred) cow, calendared for estrual periods and observed closely until it is known that she is pregnant. The first estrual period of a cow following freshening appears to have considerable range normally and, for this reason, the cow should receive more than casual observation so that all estrual periods will be noticed. The herdsman who fails to keep a record and

relies on his personal observation alone will frequently fail to observe cows showing signs of estrum and will prolong the freshening interval because of delay thus caused in the breeding date.

It may be noted from table X that the abortions due to causes other than Bang's disease were 11.3 per cent in one herd and 12.5 per cent in another. The presence of Bang's disease infection was eliminated in all cases through application of the

TABLE X—Summary of records of all cows, including first-calf heifers, for 1932.

HERDS	COWS FRESHENED	ABORTIONS		COWS NOT FRESH 1932	REMOVALS	
		No.	PER CENT		SLAUGHTERED	DIED
Allentown.....	53	2	3.7	6	6	2
Danville.....	91	0	0.0	7	21	2
Fairview.....	26	0	0.0	4	4	0
Harrisburg.....	44	5	11.3	2	13	1
Norristown.....	36	0	0.0	3	6	1
Torrance.....	40	0	0.0	2	4	1
Warren.....	101	1	1.0	11	5	2
Wernersville.....	68	4	5.1	6	17	0
Huntingdon.....	47	1	1.9	2	6	2
Morganza.....	24	3	12.3	2	5	4
Muncy.....	25	0	0.0	0	8	0
Rockview.....	94	3	3.1	16	18	3
Laurelton.....	35	0	0.0	3	3	0
Pennhurst.....	103	2	1.9	11	20	0
Polk.....	139	0	0.0	0	32	2
Selinsgrove.....	22	0	0.0	2	3	3
Totals.....	948	21	2.3	77	171	23

agglutination test, and in a few cases the fetus or milk was examined for Bang's disease with negative results.

The cause in all cases was not determined, but in one herd *Vibrio fetus* was shown to be present in practically all of the aborted fetuses. A streptococcus was found in some cases and a pure culture of a mold was found in the stomach contents and organs of one aborted fetus.

The data pertaining to the herd records, as in the two previous reports, were obtained by Fritz. Those data pertaining to the laboratory examinations were supplied by Barnes, and thus to some extent a number of the laboratory staff have contributed to this report. The report was compiled jointly by Fritz and Barnes.

ACKNOWLEDGMENTS

The writers wish to extend their appreciation to the management of the institutions, R. Bruce Dunlap and others, who have

assisted in keeping records which helped to make these reports possible. Dr. M. B. Herron's efforts to obtain records in connection with the Morganza herd are especially appreciated.

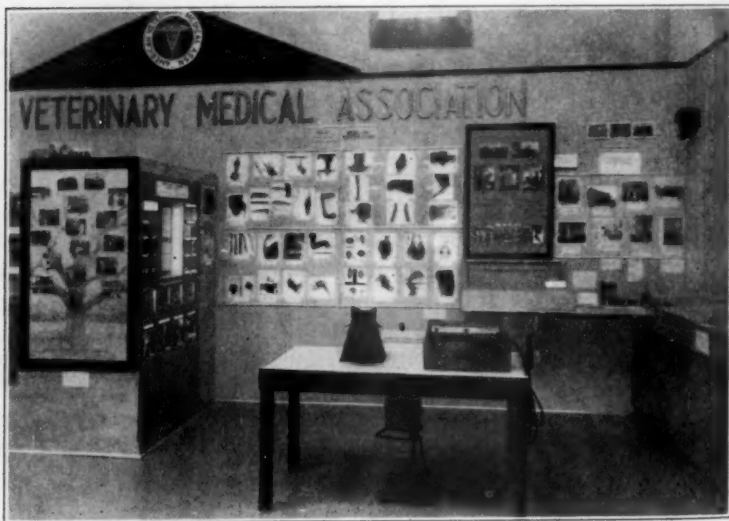
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Wichita B. A. I. Force Over the Top

The A. V. M. A. now boasts a 100 per cent membership among the ten veterinarians who make up the U. S. B. A. I. force at Wichita, Kan. This enviable record was achieved through the efforts of Dr. E. F. Cary, inspector-in-charge, and Dr. C. B. Clement, of Topeka, A. V. M. A. resident secretary for Kansas. The filing of five applications recently put the Wichita group over into the "perfect score" class. Those who proudly answer to A. V. M. A. roll-call are: Drs. E. S. Bacon, C. W. Barnhart, F. E. Brown, E. F. Cary, O. Emmitt, E. Kernohan, W. W. Lafayette, J. D. Melvin, G. W. Ornduff and J. F. Pickett.



SECTION OF VETERINARY EXHIBIT AT CALIFORNIA PACIFIC INTERNATIONAL EXPOSITION

THE EFFECT OF CERTAIN ECTOPARASITES ON THE CELLULAR ELEMENTS AND HEMOGLOBIN OF THE BLOOD OF THE DOMESTIC CHICKEN*

By CARL OLSON, Rochester, Minn.

The Mayo Foundation

Certain ectoparasites (*Dermanyssus avium*) of the domestic fowl have been shown to produce an anemic state in the host.¹ An opportunity presented itself for a study of the blood of a group of fowls spontaneously affected with lice.

MATERIALS AND METHODS

Ten chickens were selected from the affected flock. Five of these were allowed to remain in the infested quarters and five were removed to clean quarters. The five which were moved into the clean quarters were deloused by the application of a solution of nicotine sulfate to the feathers of the body under the wing and to their roosts. They were treated in this manner several times during the course of the experiment. Representative chickens from this flock were examined carefully for the presence of internal parasites, but none were found.

The blood of all the experiment birds was examined before the one group was deloused and after they had been under the conditions of the experiment for 30 days. The methods of examining the blood were those found to be suitable in a previous study.² The dye, phloxine, was used as a diluting fluid in the enumeration of erythrocytes and the method of Wiseman³ was followed in the enumeration of leukocytes. The thrombocytes were enumerated by counting the number of these cells observed in the blood-smear in conjunction with 100 leukocytes and then calculating the total number of thrombocytes per cubic millimeter of blood from the ratio found. The differential counts of leukocytes were based on the count of 100 cells observed in the blood-smears of the respective chickens. Wright's technic was used in the staining of the blood-smears. The hemoglobin was measured with the Sheard and Sanford photo-electric hemoglobino-meter.

Specimens of the parasites were obtained at the time of the first examination of the blood. These were identified as *Menopon stramineum*, *Gonioctes gigas*, *Gonioctes hologaster*, and *Liperus*

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variabilis.* The degree of parasitism of the fowls was severe at the beginning of the experiment, and continued to be so in the untreated group of chickens. It is not known how long the flock had been infested prior to the experimental period. The group treated with nicotine sulfate was free of demonstrable ectoparasites during the course of the experiment.

RESULTS AND COMMENT

The results of examination of the blood of the two groups of chickens were averaged and these average values were used as the basis for comparison (table I).

TABLE I—Results of cell counts and determinations of hemoglobin in the blood of a group of chickens infested with ectoparasites (lice) and of a similar group both before and after treatment for the removal of parasites.

EXAMINATION OF BLOOD	INFESTED GROUP (AVERAGE OF 5 CHICKENS)		TREATED GROUP (AVERAGE OF 5 CHICKENS)	
	FIRST OBSERVA- TION	30 DAYS AFTER FIRST OB- SERVATION	BEFORE TREAT- MENT	30 DAYS AFTER TREAT- MENT
Erythrocytes (millions per cu mm).....	2.52	2.68	2.41	2.96
Hemoglobin (gm per 100 cc).....	9.26	11.47	9.42	12.28
Thrombocytes (thousands per cu mm).....	26.5	61.1	38.7	38.2
Leukocytes (thousands per cu mm).....	47.5	58.1	47.1	35.1
Differential count (%)				
Lymphocytes.....	66.8	62.2	57.2	56.6
Polymorphonuclear leukocytes.....	24.4	25.0	31.6	31.0
Eosinophils.....	1.2	0.8	1.6	0.4
Basophils.....	2.2	2.4	1.8	2.6
Monocytes.....	5.4	9.6	7.8	9.4

In both the treated and untreated groups of chickens the average erythrocyte count and value for hemoglobin was higher at the end of the experimental period than at the beginning. This increase is apparently due to seasonal factors. A study of the increase in the number of erythrocytes and in the value for hemoglobin in chickens in the fall of the year has been made

*These specimens were identified by Dr. E. F. Waller, Division of Veterinary Medicine, University Farm, Saint Paul, Minnesota.

previously.⁴ The increase of these elements was slightly greater in the group of chickens from which the ectoparasites had been removed. This suggests that chickens which are severely infested with lice may manifest slight anemia. The cause of this anemia is not clear. It may be the result of a general physical disturbance from the irritating effect of the parasites, it may be the result of the fact that these parasites extract blood from the host, or it may be the result of some erythrocyte toxin which the parasites introduce into the host.

The average thrombocyte count and average total leukocyte count in the infested group of birds was higher after the 30-day period had elapsed than was observed in any of the other periods of observation of the two groups. This is suggestive that thrombocytosis and moderate leukocytosis may be associated with severe chronic infestation with lice.

The numbers of the various types of leukocytes as determined by the differential counts revealed little or no variation that could be attributed to the effect of the lice.

SUMMARY

Observations on the number of cells and quantity of hemoglobin in the blood were made on two groups of five chickens each. The chickens were severely infested with lice (*Menopon stramineum*, *Goniocetes gigas*, *Goniocetes hologaster*, and *Liperus variabilis*). One group was segregated in clean quarters and kept deloused for 30 days. Examinations of the blood then were repeated.

A slight anemia was found in the infested group, apparently as a result of the effect of the ectoparasites. Thrombocytosis and moderate leukocytosis was observed in the infested group after they had been hosts to the ectoparasites for a period of at least 30 days; these two phenomena are of uncertain significance.

No changes of the differential counts of the leukocytes were observed.

These observations indicate that severe infestations of chickens with lice in all probability is not associated with any marked anemia.

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BETTER GENERAL ANESTHESIA IN ANIMALS

I. Oxygen-Ether Controlled Anesthesia by the Closed Method in the Dog, with Morphine as Preanesthesia Hypnotic*

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Aseptic surgery is difficult, if not impossible, when the patient is improperly prepared for the ordeal. Operation on the struggling, groaning patient is not a type of surgery of which the veterinarian can be proud. The fact remains that a well-controlled general anesthesia is imperative in the surgery of animals, not only for humane reasons, but also to facilitate the surgical technic, and to promote rapid postoperative recovery. The careful surgeon who does good surgery, and a great deal of it, knows this best. The laity of today is well educated to the need of anesthesia in operations, and is demanding that operations on animals be performed with the least possible discomfort to the patients.

It is agreed that in veterinary surgery the general practitioner is required to accept responsibility for anesthesia and to operate at the same time. The value of some animal patients further complicates the use of general anesthesia; the cost must be reasonable. Thus an experienced anesthetist, as is employed in human surgery, is out of the question. But having had wide experience in the use of general anesthetics and their mode of administration, the practitioner may be able to train his lay assistant, who could soon be of inestimable value to him when occasion so requires.

The present problem was completed in the hope of providing a method of anesthesia which is easy to administer, yet efficient, safe and inexpensive to operate. It is believed by the author that this method, introduced in small-animal hospitals, and used by the general practitioner, should greatly simplify anesthesia, give excellent results, and promote and elevate the professional respect of the general public for the veterinarian, thus increasing his practice.

APPARATUS USED

For a long time, ether and chloroform have been administered to animals by the drop (open) method. This needs no special

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dispensing apparatus. It is not so desirable as other methods since there is little if any control over the anesthetic used. Other new agents introduced, such as chloralhydrate, and the derivatives of diethyl barbituric acid (pentobarbital sodium, amytol sodium, pernocton and others) cannot be classed as general anesthetics, because they are positively dangerous when the hypnotic dose is overstepped. Resuscitation in cases of collapse from respiratory or cardiac failures is difficult, and many of the animals succumb to inadequate means of restoration.

Recently Volker and Weingart¹ have introduced a form of hot-water ether vaporizer, with an outlet consisting of a tracheal catheter. Another hospital-size anesthesia apparatus was introduced by Henkels,² with which ether and chloroform in appropriate quantities are vaporized with oxygen and administered from a bellows reservoir through an inhaler and mask. This is a gratifying step toward the administration of better general anesthesia to animals.

In human medicine the vapor method of anesthesia in which oxygenated air, oxygen, or other gases are allowed to pass over or through the anesthetic agent have been in use. The vaporized mixture is then passed on to the mask inhaler, the flow of the anesthetic gases being controlled, and constantly measured amounts used. Other general anesthetics, such as ethylene and nitrous oxide-oxygen, with or without ether, are of great value in human medicine. In animals this form of anesthesia is not practical and is too costly.

An attempt was made to utilize some of the principles used in human anesthesia, and an anesthesia head was procured and modified to make it suitable in dog anesthesia. Heidbrink model R anesthesia head was introduced. This is identical with the model T apparatus, but without an ether vaporizer. It delivers oxygen and nitrous oxide or carbogen (O_2 and CO_2 mixture) in required quantities and reduces the size "G" medical oxygen-tank pressure to working pressure. Supplemental carbon dioxide-oxygen, and small emergency oxygen tanks may be attached to the apparatus, which are of value in cases of collapse from anesthesia or operative shock. An automatic tank-pressure regulator was used to reduce the high pressure to working pressure from which a flexible rubber tubing carries the gas to the anesthetizer under reduced pressure.

An ether vaporizer was made with a control for the direct flow of oxygen, carbon dioxide, or a mixture of the two, when rebreathing was practiced or resuscitation was necessary. When the anesthetic gas mixture was desired, the control valve was

turned to permit the bubbling of the gas through a layer of ether (fig. 1). To maintain a sufficiently large flow of the anesthetic gas, a rubber-bag reservoir (7-quart size) was interposed between the inhaler tube and the vaporizer. The size of this bag was more than enough to take care of the inspiratory tidal requirements of any size of dog. In fact it was found large enough for the average pig. An antistatic inhaler tube, 44 inches long, then was placed between the bag reservoir and the inhaler mask.

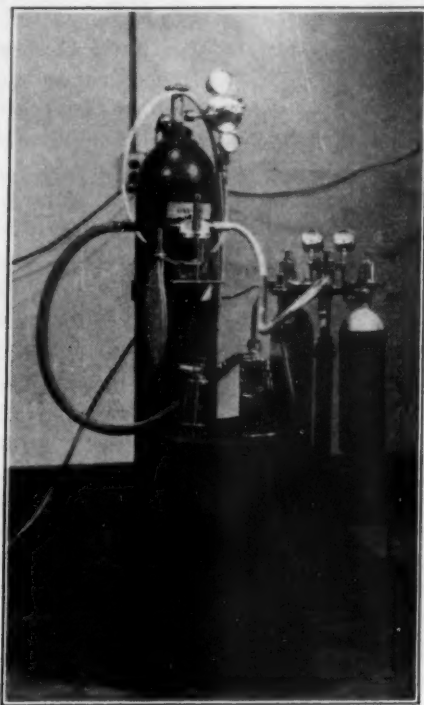


FIG. 1. The apparatus used in oxygen-ether anesthesia in dogs by the closed method.

The inhaler mask was made from Heidbrink expiration valves which were fitted to metal mask cones of two sizes (fig. 1): a, for large dogs, large inhaler cone $6\frac{3}{4}$ inches long, 4 inches wide at the mouth, and $2\frac{3}{4}$ inches wide at the small end and pierced by the inhaler valves; b, for small dogs, small inhaler cone made in similar manner but 5 inches long, $3\frac{1}{2}$ inches wide at the mouth end, and $2\frac{3}{8}$ inches wide at the small end. In operating,

the inhaler mask is wrapped with a thin cloth, part of which is turned in at the face end. In this manner a snug fitting is made around the muzzle of the dog. To prevent further escape of the anesthetic gas, a thin towel may be wrapped around the end of the cone and the face of the dog, but this was found superfluous in most cases. It might be necessary in a dog with a very large head. A permanent halter-like arrangement may be employed to hold the mask in place if an assistant is not available.

The anesthetizer regulates the flow of gases and can be set with appropriate valves for any required pressure with a mixture of oxygen about 20 per cent volume pressure. Any desired blast of vapor anesthetic may be obtained to suit the requirements of the patient and the surgeon. Further modification of the apparatus is planned to make it suitable for all animals.

RESULTS OBTAINED

Fifty dogs of all ages and sizes were anesthetized; also, one pig, weighing about 140 pounds, and a cow. None of the animals were prepared for anesthesia to test the efficiency of the oxygen-ether vapor when it was administered by the controlled closed method. Some of the animals were regular hospital patients, and necessary major operations were performed. Others were pound dogs in poor physical condition.

Detailed study was made of the cardio-vascular and respiratory systems before and during the general anesthesia. The animals received from 0.25 to 0.5 gr. of morphine, according to size. The average dose of morphine was 0.5 gr. Some of the animals were nauseated from morphine and vomited before anesthesia. One of the dogs vomited during recovery from the anesthetic. No respiratory or cardiac embarrassment was noted at any time. The blood pressure was slightly elevated immediately after induction, but 30-minute anesthesia showed in some cases a fall in blood pressure. During induction and immediately following, there was an acceleration of the pulse and respirations. In all animals anesthetized, the heart, pulse and respirations were strong. In three cases the animals were supersaturated with the anesthetic until respirations stopped and the heart became feeble. This was done in order to test the resuscitation power of the apparatus. The animals were allowed to remain in this state until the heart showed signs of failing, then the anesthesia was stopped and resuscitation started with the aid of a mixture of carbon dioxide 5 per cent and oxygen 95 per cent,³ interchanged with a flow of pure medical oxygen at about 20 per cent volume

pressure. It was very easy to restore respirations, by using the anesthesia apparatus to resuscitate, while artificial respirations were introduced by compressing the thorax a few times. Recovery was prompt and the animals were breathing normally in a few minutes. It was found difficult to stop respirations with an overdose of the anesthetic mixture. Some of the dogs were repeatedly anesthetized each day for four to five days. Recovery was excellent in these animals, without noticeable after-effect.

To study the influence of the anesthetic upon the heart and respirations, pneumograms and cardiograms were made. Figure 2 presents a pneumogram of a 4-year-old, 70-pound dog during induction, showing the respiratory volume index and frequency just before the surgical anesthesia was established and when complete anesthesia was noted (morphine 0.5 gr.).

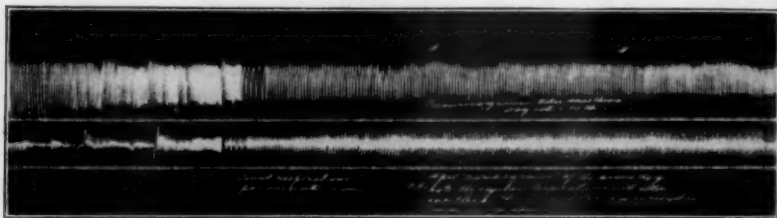


FIG. 2. Ether-oxygen anesthesia pneumogram. A and A, surgical anesthesia pneumogram; before A and A, induction pneumogram of a 4-year old, 70-pound dog (downstroke inspiration, time in seconds).

Subsequent tracings were made of the heart and the lungs of the same dog (fig. 3) following one-hour anesthesia, and under the influence of the anesthetic. Note the regular frequency of respirations and the heart cycles.

In order to show the remarkable maintenance of frequency and volume index of respirations, a normal pneumogram and an

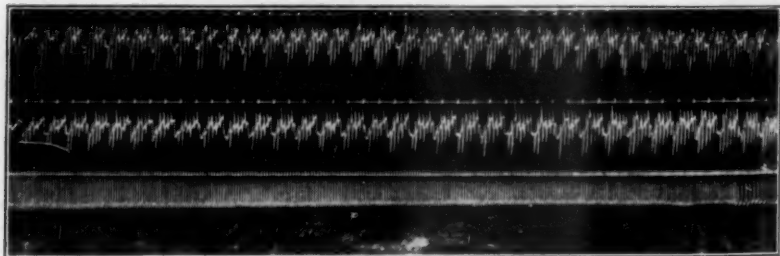


FIG. 3. Ether-oxygen anesthesia pneumogram and cardiogram. a, pneumogram; b, c, cardiogram (morphine 0.5 gr., one-hour anesthesia, time in seconds).

anesthesia pneumogram were made of a 2-year-old, 30-pound dog (fig. 4).

It was found further that, by increasing and decreasing the volume concentration of the anesthetic, corresponding fluctuation of respiratory volume index was noted (fig. 5). The heart did not show volume changes (morphine 0.5 gr., anesthesia 40 minutes).

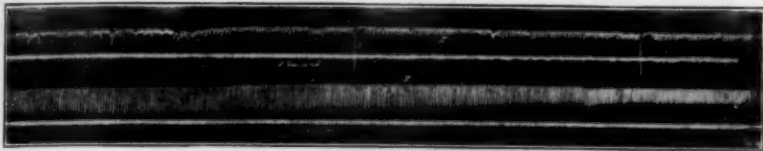


FIG. 4. I and II, normal pneumogram (I, deep respiration); III, anesthesia pneumogram (time in seconds, downstroke inspiration).

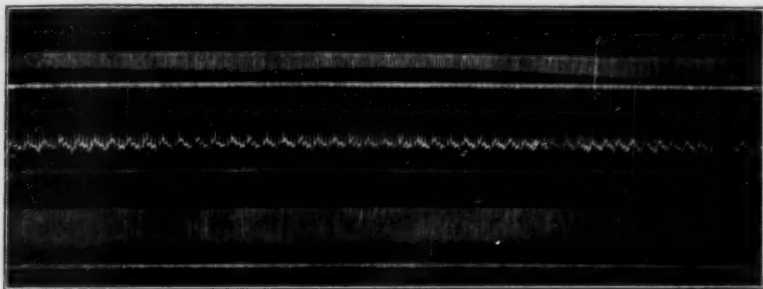


FIG. 5. I and I, amount of anesthetic decreased; before I and I, increased (pneumogram); III, surgical anesthesia pneumogram, average quantities of the anesthetic used (volume index constant, 2-year old, 30-pound dog, 40-minute anesthesia, morphine 0.5 gr.); II, cardiogram.

From the pneumograms and the cardiograms one may conclude that with general anesthesia by the closed method, in which the anesthetic is diluted with measured quantities of medical oxygen and the anesthetic mixture controlled, there was but slight fluctuation in the cardio-respiratory volume and frequency.

In all animals anesthetized, including the surgical cases, the mucous membranes remained pink, signifying normal pulmonary and tissue ventilation.

In table I the age, weight, induction time, anesthesia time, recovery time, and anesthesia used are recorded in only those dogs anesthetized for 30 minutes. (Animal was considered recovered when it could stand.)

As shown in table I, the average time of induction was two minutes and 85 seconds, or about three minutes. The amount

TABLE I—*Thirty-minute anesthesia dogs (preanesthesia, morphine 0.5 gr.).*

DOG	AGE (YRS.)	WEIGHT (LBS.)	INDUCED (MIN.)	ETHER (CC)	RECOVERED (MIN.)
1	2	35	3	55	20
2	1½	40	3½	45	25
3	5	40	4	38	18
4	2½	45	3	45	20
5	1½	18	2	30	25
6	3	35	2	58	30
7	5	40	4	38	18
8	2	28	1¾	50*	95
9	4	40	3	68	18
10	2	35	2	50	25
11	3	45	2½	35	40
12	6	25	3	25	15
13	5	30	4	40	38
14	4½	60	3	50	30
15	4	70	5	50	30
16	2	30	2½	45	30
17	2	30	2	45	30
18	4	70	3	60	30
19	3	40	2	45	45
20	4½	38	3½	40	32

*Preanesthesia, amytol sodium 3.5 gr. intravenously. Excellent recovery in all cases.

of ether used was much smaller than when the open anesthesia is used. Of the 20 dogs at 30-minute anesthesia, the average dose of ether used was 45.56 cc (a quarter-pound can holds about 160 cc of ether). The number of dogs anesthetized (all sizes and weights) with a type "G" medical oxygen tank of 1,150 gallons capacity was 34, having 30-minute anesthesia, which would represent a cost of from 12 to 14 cents worth of oxygen per dog per 30 minutes. The cost of ether per 30-minute anesthesia per dog was about 8 to 9 cents. A total cost of about 22 cents per dog per 30-minute anesthesia. This is a reasonable cost considering the waste of ether by vaporization when the open method is used.

While the pig and the cow are supplemental cases, they are of interest. The pig was as easily anesthetized as the dogs by the closed vapor method and maintained so. The cow was a remarkable case in that the thorax was opened through a resected rib for exploratory operation (the lungs were collapsed). The apparatus maintained the oxygen requirements of this cow by the closed anesthesia method (the lungs, heart and diaphragm were explored by passing the hand and arm into the thorax).

THE RELATIVE MERITS OF OXYGEN-ETHER ANESTHESIA,
PARTICULARLY IN DOGS, BY THE CLOSED METHOD

One of the dangers of general anesthesia, as it is usually administered to animals by the open method, is due to the lack of oxygen. Invariably the animal shows signs of anoxemia during induction and throughout anesthesia. This is particularly true when improper masks are used, when the induction is too rapid, or the technic poor. Resuscitation in cases of collapse from cardiac or respiratory failure, or the failure of both organs is difficult due to inadequate means of restoration at hand. The result is that many animal patients succumb. Under conditions of lack of adequate oxygen, it is evident that the respiratory muscles and the heart may be weakened considerably. The respiratory and cardio-vascular centers also are depressed from the asphyxiating method of induction and anesthesia. Symptoms of asphyxia may appear almost any time with failing respirations, the minute volume and tidal air decrease, and there will be cyanotic mucous membranes and feeble heart. Such respiratory and circulatory embarrassments are bound to be controlled when appropriate quantities of oxygen are used with ether or chloroform. It is known that blood changes depend upon the amount of oxygen in the circulation. A few years ago, Waters^{4, 5} pointed out that oxygen in anesthesia serves in the following manner: (a), to support life by taking care of the oxygen requirements of the body; (b), to dilute the anesthetic gas. As a result, asphyxia and the too strong action of the anesthetic are prevented.

With the aid of oxygen, maximum relaxation was obtained, with minimum danger to the patient. The established surgical anesthesia was easily maintained with very small quantities of ether. Fractional and complete rebreathing was practiced for limited periods, during which the flow of the anesthetic mixture was stopped. It is possible that the accumulations of carbon dioxide in the gas reservoir, due to the rebreathing practiced, might have been acting synergistically, which reduced the quantity of the anesthetic used.⁶ The stage of excitement was very short, and complete relaxation could be obtained quickly with perfect safety to the patient. Postoperative respiratory complications did not arise, even though three dogs (these were operative cases) had excessive mucus during operation. In all animals having had morphine as a preanesthesia basal hypnotic, the recovery was smooth and without excitement. While morphine is objectionable, having a tendency to produce vomiting and

TABLE II.—The outstanding operated cases are indicated (ether-oxygen closed anesthesia).

ANIMAL	AGE (YRS.)	WEIGHT (LBS.)	PRE- ANESTH. MORPH. (GRS.)	INDUCED (MIN.)	TIME OF ANESTH. (MIN.)	ETHER USED (CC)	RECOVERY TIME (MIN.)	NATURE OF OPERATION AND REMARKS
English Setter...	4	30	0.5	4½	90	100	30	Malignant mammary growth. All glands removed. Recovery uneventful
Setter Dog.....	1	35	0.5	5	28	34	24	Hystero-ovariectomy. Recovery uneventful
Black Dog.....	3	38	0.5	2	70	80	28	Hystero-ovariectomy. Recovery uneventful
Police Dog.....	4½	66	0.5	4½	80	110	40	Hystero-ovariectomy. Adenosarcoma of the mammary glands (removed). Recovery uneventful
Yellow Female..	10	18	—	3	60	60	48	Cesarean section. One puppy alive. (This animal was in very poor condition and died 4 hours after operation from post-operative shock)
Fox Terrier....	3	20	—	2½	70	50	15	Cesarean section. In labor when anesthetized. Three live active puppies. Recovery of the mother and puppies uneventful
Black Dog.....	4	68	0.5	4	107	126	42	Resection of the small intestine and lateral anastomosis. Recovery uneventful. Lateral destroyed
White Pig.....	1	145	—	1¾	65	127	18	Sclerotic and infected cord. Removed (wt. about 22 lbs.). Recovery excellent, uneventful
Red Cow.....	2	580	—	7½	75	125	58	Traumatic pericarditis. Exploratory operation by way of the open thorax. Lungs collapsed. Recovery uneventful. (This animal had 40 cc of chloroform as a starting anesthesia, followed by ether)

constipation, disturb carbohydrate and fat metabolism, and interfere with the absorption and ultimate elimination of the anesthetic, it protects against respiratory and circulatory failures during induction. It is one of the best of the basal hypnotics and postoperative analgesics for dogs.

As to the disposition of the ether in the vaporizer from previous anesthesia, it was used on subsequent cases without noticeable danger to the patient. Laws⁷ reports that since, in the closed method of anesthesia, oxygen is bubbled through the ether, impurities are formed in the apparatus during administration. He therefore believes that surplus ether from the previous anesthesia be discarded. Samples of ether examined did not show appreciable quantities of oxidizing products when superior quality ether from a newly opened can was used.⁸

Since oxygen-ether combinations form explosive mixtures, a naked flame or electric sparks should be excluded from the operating room. For the same reason, x-ray machines, which may create sparks, should not be in operation. The apparatus should be so arranged that there will be no lack of the anesthetic mixture. To control static electricity it is well to insulate the parts of the apparatus and the patient (this can be done very easily). In this manner the static is carried away by means of a water pipe into the ground. Humidity in the operating-room is useful to ground the static.

The author wishes to express thanks to Messrs. B. Christopher and Harold Peterson, for helping with the anesthesia and taking photographs, and other students who gave valuable assistance.

SUMMARY

Suitable apparatus was made for oxygen-ether anesthesia (by controlled closed method) in dogs with inhaler masks. The anesthetizer regulates the flow of gases by appropriate valves. A blast of vapor anesthetic could be obtained to suit the requirements of the patient and the surgeon.

Detailed study was made of the cardio-vascular and respiratory systems, before and during the general anesthesia. No respiratory or cardiac embarrassment was noted. Cardiograms and pneumograms were made to show any changes of the respiratory and cardiac volume index and frequency.

Excellent results were obtained in all animals, some of which were regular surgical patients. Others were pound dogs (two supplemental surgical cases were anesthetized, one pig and one cow). Further modification of the apparatus is planned to make it suitable for the anesthesia of all animals.

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BUREAU TRANSFERS

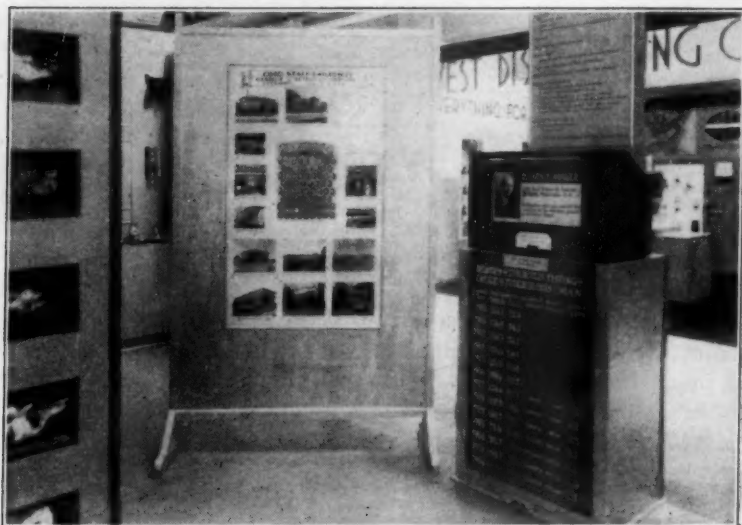
DR. ARTHUR R. SMITH (U. P. '08), from Washington, D. C., to Pittsburgh, Pa., in charge of meat inspection.

DR. G. E. BOWLER (Mich. '30), from tuberculosis eradication at Montgomery, Ala., to meat inspection, at New York, N. Y.

DR. CHAS. A. HULBUSH (McK. '08), from Spokane, Wash., to Walla Walla, Wash., on meat inspection.

DR. R. N. BIRDWHISTELL (Cin. '14), from Columbus, Ohio, to Fostoria, Ohio, on serum-virus inspection.

DR. E. F. JAMESON (K. C. V. C. '06), from Zanesville, Ohio, to Madison, Wis., on meat inspection.



SECTION OF VETERINARY EXHIBIT AT CALIFORNIA PACIFIC INTERNATIONAL EXPOSITION

A NOTE ON *ONCICOLA CANIS* (KAUPP), A PARASITE OF THE DOG*

By R. E. REBRASSIER, Columbus, Ohio

Division of Veterinary Parasitology, Ohio State University

Oncicola canis (Kaupp, 1919) is a small parasite, belonging to the class Acanthocephala, which occurs in the intestinal tract of the dog. This species of parasite has not been reported very often in the United States, only seven instances of its occurrence having heretofore been recorded.

It was reported in 1909, by Kaupp,¹ who described the parasite as *Echinorhynchus canis*. This specimen was collected in San Antonio, Texas, in 1902, by Dr. J. W. Parker. Another occurrence of this parasite was reported by Hall and Wigdor,² the specimen having been collected by Dr. C. C. Whitney, from a dog at College Station, Texas. Hall and Wigdor reclassified this parasite and placed it in the genus *Oncicola* Travassos, 1916. The third report on the occurrence of this parasite was from Lincoln, Neb. This specimen was collected by Dr. A. D. Brewer, in 1897, and was reported by Van Cleave.³ This specimen had been referred to as *Echinorhynchus sp.*, by Ward.⁴

Price⁵ reported four additional cases of infestation found in dogs autopsied at College Station, Texas. These four dogs were all from Texas and were autopsied in the years 1917, 1921, 1922 and 1926, respectively. Price gives an excellent description of this parasite based upon a study of toto mounts, dissections and serial sections of mature males and females.

In as far as the writer is aware, there have been no cases reported since those by Price,⁵ and it is the purpose of his article to report a case occurring in Columbus, Ohio, autopsied at the College of Veterinary Medicine, Ohio State University.

On the morning of March 3, 1935, a mongrel dog was found lodged between two old buildings. It did not respond to calling, or other efforts for removal. Police were notified and the animal was killed and brought to the College for an examination for possible rabies. An autopsy was performed and it was found that the animal had suffered fractures of the fourth and fifth ribs on the right side and of the eighth and ninth ribs on the left. In the intestine, 24 specimens of *O. canis* were found attached to the ileum. There were also present a few specimens of *Toxocara* and *Dipylidium*. An examination of the brain for Negri bodies was negative.

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It is unfortunate that no history could be obtained on this animal, because it may have added some data on the life history of the parasite. Every effort was made to determine the origin of this dog, but nothing could be ascertained. This case is the first to be reported from Ohio and only the second case to be reported from any state other than Texas. If, as supposed, the nine-banded armadillo serves as the intermediate host for *O. canis*, and the range of this armadillo is limited, as given by Pratt,⁶ to southern Texas and New Mexico, it is reasonable to assume that the dog was originally from the South, probably from Texas.

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Kansas Remedy Law Has Teeth in It

Among the unusual cases recorded in Kansas judicial procedure, one from Rush County, Kansas, recently came to light. In this case, a salesman was detected by one of the inspectors of the Control Division of the State Board of Agriculture in orally misrepresenting a poultry tonic as a remedy for various poultry diseases, notably bacillary white diarrhea. The product was prepared by a poultry remedy company of another state and is registered under the Kansas Live Stock Remedy Act.

This oral misrepresentation is contrary to Kansas law. The case is unusual in that the seller was pronounced guilty and fined on account of the verbal statements made by him. Furthermore, it is the first conviction on such charges ever secured through the activities of the Control Division under that particular clause of the live stock remedy law.

In past years, farmers of Kansas and other states have suffered much in financial loss from the invasion of traveling agents selling so-called live stock and poultry remedies. Many of them have been honest in their dealings, but some have been rather dishonest. The latter brought disrepute on the whole traveling fraternity representing live stock remedies. Due to the rigid inspection under the live stock remedy law, cases of infraction now are rare, and violators do not last very long in the field.

CLINICAL AND CASE REPORTS



SYRINGOMYELIA IN A JERSEY CALF*

By J. F. BULLARD, *LaFayette, Ind.*

Purdue University Agricultural Experiment Station

A ten-week-old Jersey heifer calf was brought to the laboratory for an examination, as it had, according to its owner, suddenly lost control of its hind quarters.

An examination revealed a well-developed calf in excellent physical condition. It was in a recumbent position, could move its hind legs only slightly, and was unable to get up. The temperature, pulse and respirations were normal. All visible mucous membranes were slightly congested. The calf was placed in a well-bedded box-stall, watered and kept for observation. The bowel evacuations were hard, mucus-covered and decreased in amount. A quart of mineral oil was given through the stomach-tube. This treatment relieved the constipation and apparently was what was needed to clear up the membranes. The inability to get up remained during the entire ten-day observation period. During this time the calf was turned frequently from one side to the other. Toward the end, the membranes were again becoming congested. During the entire time, the appetite had been good but the diet had been restricted. As no improvement was noticeable the calf was destroyed.

Upon autopsy, the only lesions found were confined to the spinal cord. Ventral to the cord and outside the dura in the region of the second and third lumbar vertebrae was a blood clot, 2 cm long by 1 cm wide. Cross-sections of the cord in this location, made at 2-mm intervals, revealed a small, elongated cavity somewhat pear-shaped on cross section. It was 3 mm wide by 1.5 cm long and situated dorsally to the central canal. It contained a thick, reddish-brown exudate.

Microscopic examination of a section of the cord showed extensive hemorrhage outside the dura. In the central portion of

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the cord was a large area of liquefaction necrosis in which there were many red blood cells and phagocytes. A subacute purulent inflammation was present throughout the entire cord substance.

The lesions found on autopsy might be due to several causes. Trauma, as far as could be determined from the history, had apparently never occurred. The normal condition of the skin and subcutaneous tissues over the area would also tend to bear out this supposition.

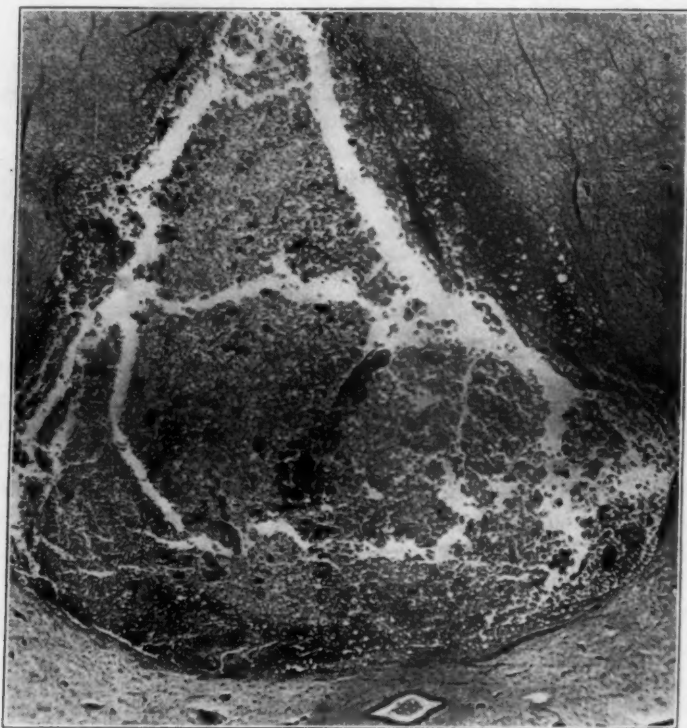


FIG. 1. Cross-section of cord showing relationship of area of liquefaction necrosis to the central canal. Immediately below the canal the dorsal end of the ventral fissure may be seen. The small dark bodies throughout the mass of necrosis and especially at its borders are phagocytes which have taken up debris from the necrotic cord.

Infection, another possible cause, might produce this lesion. From the history one would be inclined to think that this too was not the cause; again, a defect in the circulation should also be considered. Regardless of the cause of the lesion, it in itself was sufficient to produce the clinical symptoms.

On gross examination, a provisional diagnosis of syringomyelia for an adventitious lesion of this type is justifiable; however, on microscopic examination no evidence of gliomatous proliferation was found. Syringomyelia is often associated with glioma. For practical purposes this diagnosis can be made when recalling what the word "syringomyelia" really means. Actually there was a liquefaction necrosis of the spinal cord with hemorrhage and purulent inflammation.

The accompanying photomicrograph (fig. 1), together with its legend, is self-explanatory.

ANOMALOUS HEART IN A CALF*

By J. F. BULLARD, *LaFayette, Ind.*

Purdue University Agricultural Experiment Station

Because a young Guernsey calf 24 hours old had not been on its feet, the writer was called to make an examination. The subject was well developed physically and was in a profound state of coma. The respirations were very shallow, seeming minutes between them. The pulse also was decreased in rate. The mucous membranes were cyanotic. The calf died a few hours after the examination.

At autopsy, gross lesions were found only in the heart and lungs. The heart was somewhat out of proportion to its normal shape, as the left ventricle was in extreme systole while the right ventricle showed dilatation to such an extent that it comprised the entire apex. Both auricles were contracted. Upon opening the heart, several interesting features were observed. The left ventricular wall was 2.5 cm thick. Extreme mitral stenosis was present, the opening being 13 mm in diameter. The valves were very hard and firm. The ventricle measured 4.5x1.5 cm and ended in a blind cavity on account of the fact that there was no aorta at its normal point of origin.

As previously stated, the right ventricle was much enlarged. Its dimensions were 9.5x7 cm, while the wall was 11 mm thick. The tricuspid valve was greatly dilated and the auricular-ventricular opening measured 35 mm in diameter.

In tracing the circulation certain malformations were found which were as outstanding as the heart itself. The venous flow into the right heart was normal until it passed the pulmonary valve. Three centimeters from this point a small, constricted

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artery, approximately 0.5 cm in length, was given off the pulmonary artery which immediately divided into two large arteries. These corresponded to the aorta and the common brachiocephalic trunk. From this point on their distribution was normal. The pulmonary artery also continued normally to the lungs. At first glance, both lungs appeared to be com-

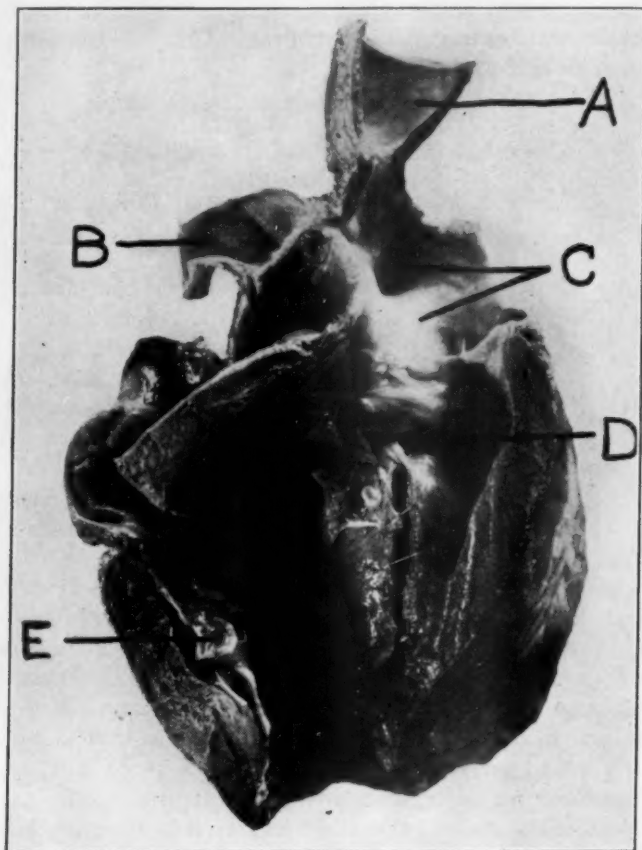


FIG. 1. A, aorta; B, common brachiocephalic trunk; C, pulmonary artery; D, right ventricle; E, cusp of tricuspid valve.

pletely atelectatic. Upon closer examination fully two-thirds of each were solid, while only the upper third contained any air. The amount was very scanty and only traces could be expressed. Each lung showed an extreme passive congestion both being a deep, dark red color. Small sections from the upper parts of

the lungs all but sank when placed in water and remained just below the surface.

Two very small pulmonary veins, each approximately 0.5 cm in diameter entered the left auricle. The foramen ovale was patent and was practically the only means of escape for the small amount of blood that reached the left heart.

The accompanying photograph (fig. 1) shows the exposed right ventricle comprising the apex. The aorta and common brachiocephalic trunk are seen branching from the pulmonary artery, which has been opened by a longitudinal incision, then partly dissected and the remaining flaps reflected.

In reviewing the course of the circulation in this case, one sees that practically the entire amount of blood in the whole system was venous. This fact would account for the clinical symptoms manifested.

In a case of mitral stenosis, with a normally formed circulatory apparatus, one would expect the right ventricle to bear the brunt of the work and therefore enlarge. In this case the enlargement was due no doubt to the anomalies of the cardiovascular system rather than the mitral stenosis with its associated insufficiency.

ANAPLASMOSIS OBSERVED IN WYOMING*

By GEORGE W. STILES, JR., *Denver, Colo.*

*Branch Pathological Laboratory, U. S. Bureau of
Animal Industry*

While making field investigations pertaining to anaplasmosis in northwestern Colorado, during the year 1932,¹ the writer received various reports of a strange, new cattle disease from live stock owners living in or near Wyoming. Since that time, similar information has come to the attention of Dr. H. D. Port, state veterinarian of Wyoming, who had a recent call to visit a ranch in his state where cattle were dying with symptoms of "yellow jaundice." At the invitation and through the courtesy of Dr. Port, the writer accompanied him, July 19, on an inspection trip to Washakie County, Wyoming, for the purpose of making an investigation of the above cattle losses.

HISTORY

During the summer of 1934, some 25 head of adult Hereford cattle were found dead on the range in the vicinity of Nowood,

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Wyoming. The herd consisted of about 2,000 head and was owned by a number of individuals. The cattle ranged over an area of approximately 50,000 acres of rough, mountainous, sage brush land. The chief clinical symptom observed by the owners in these cattle was a yellow condition of their skin. They went off feed, became gaunt, and died. The physical condition of the sick cattle during the summer and fall of 1934, as noted by the owners, corresponded to the symptoms observed in 1935.

CASE REPORTS

The 2,000 cattle in the herd ranged together until July 1, 1935, when they were separated; 1,000 head, owned by one firm, remained on the same range. It was in this herd that the following cases are reported:

Case 1: Four-year-old cow, with suckling calf, first observed to be sick July 1. Death occurred four days later.

Case 2: Cow, 5 years old, with nursing calf, sick July 6. Died six days later.

Case 3: Cow, 4 years old, with suckling calf, first observed sick July 14, died the 19th. (All three of these cows were Herefords, and according to the herdsman, their symptoms were identical with those of anaplasmosis.)

Case 4: Observed to be off feed July 18, and on the 19th her temperature was 103.2° F. She was pale, gaunt, hemoglobin (T.) 45, and a stained blood-smear showed anaplasma in about 10 per cent of the red cells.

Case 5: This animal appeared a little gaunt, she was not eating, and her temperature was 103.4° F. Approximately 1 per cent of the red cells contained marginal bodies.

Since July 19, five other cattle have sickened on this ranch, presumably of anaplasmosis; one of these died, two recovered, and the two others are under treatment with Fowler's solution, a total of ten cases in this herd this year, with a mortality of 50 per cent.

NECROPSY FINDINGS

Case 3 was found soon after death. Inspection revealed a deep yellow color of the skin and visible mucosae. On her abdomen were attached several ticks, six of which were fully engorged. Other adult ticks were observed, having recently attached to the animal. They were all of the same species, *Dermacentor andersoni*. These ticks were carefully collected, placed in a glass jar containing green grass, and covered with gauze. They were shipped to Dr. C. E. Sanborn, professor emeritus of entomology, A. & M. College, Stillwater, Oklahoma. The ticks

arrived there in good condition, and are in process of experimentation in connection with the anaplasmosis project being conducted under federal and state agreement.

In 1932, Dr. Charles W. Rees² transmitted anaplasmosis from sick cattle to susceptible animals by infected larva-to-nymph stage ticks (*D. andersoni*), the incubation period being about 38 days. In 1933, Rees³ showed that nymphs of *D. andersoni* engorged on anaplasmosis cases transmitted the disease as adults, when placed on susceptible cattle.

The autopsy findings observed in cow 3 were typical for anaplasmosis.⁴ The blood was thin and watery, and there was a pronounced icterus; the lungs were pale in color, and on the heart were large hemorrhagic blotches. The greatly enlarged spleen was of a blackberry-jam consistency. Under the microscope, stained blood-smears showed that approximately 25 per cent of the red cells contained anaplasma. The hemoglobin index (T.) was 20 per cent. No abnormal color was observed in the urinary bladder. Evidence of constipation was noted.

On August 22, 1935, a suspected case of anaplasmosis in a cow was observed by Drs. P. S. Moe and H. L. Shorten, B. A. I. Meat Inspection Division, at one of the Denver packing-plants. Shipping records disclosed the fact that this cow originated in Carbon County, Wyoming. Microscopic examination of the blood confirmed the diagnosis of anaplasmosis. It now appears that cattle in two widely separated areas in Wyoming are known to be affected with anaplasmosis.

There was an abundance of moisture, and ticks were reported in large numbers during the spring season in this region. During the month of May, many ticks were observed on both man and beast.

The wildlife of this section consists of deer, antelope, hundreds of coyotes, bob-cats, rock chucks, prairie dogs, ground squirrels, chipmunks, pack rats, muskrats, beavers, skunks, badgers, porcupines and birds, including sage hens, all of which furnish excellent sources of food for the voracious ticks. In addition to the wild animals, many cattle, horses, sheep, goats and dogs were observed to harbor numerous ticks.

Horse-flies were not observed in large numbers at the time of our inspection. Four different species were collected, however, for Prof. Sanborn's museum; one of these has been identified as *Tabanus punctifer*. The occurrence of horse-flies in Wyoming appears to be of comparatively short duration. They are best observed during the heat of the day and in the warmest months. Deer flies (*Chrysops* spp.) are abundant on the low-

lands along the streams, and are very annoying. Flies of various species^{5, 6} could be a factor, together with ticks, in the spread of anaplasmosis, as shown by the investigations conducted at the Oklahoma Experiment Station.

SUMMARY

The occurrence of anaplasmosis in cattle has been established in two widely separated localities of Wyoming.

On one freshly dead cow, several ticks (*Dermacentor andersoni*) were recovered, some of which were fully engorged. These are being used for further experimental study.

The mortality in one outbreak was five of ten cases.

Anaplasmosis has been definitely diagnosed in 15 states: Alabama, Arizona, California, Colorado, Delaware, Florida, Georgia, Kansas, Louisiana, Mississippi, Missouri, Nevada, Oklahoma, Texas and Wyoming.

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A CASE OF BOVINE COCCIDIOIDAL GRANULOMA FROM THE SOUTHWEST*

By GEORGE W. STILES, JR., and C. L. DAVIS

Branch Pathological Division, Bureau of Animal Industry
U. S. Department of Agriculture, Denver, Colo.

In 1933, the authors reported the first case of bovine coccidoidal granuloma in Colorado.¹ Previous to that time, 19 bovine cases and one case in a sheep had been recorded, the first case having been reported by Giltner,² in 1918. To our knowledge, all these latter cases were found in California cattle and were confined principally to southern California. It appears from the above data that the occurrence of this disease in animals in sections of the country other than the state of California is worthy of a report. Coincidental with these findings in animals, it is of particular interest to note that of the 286

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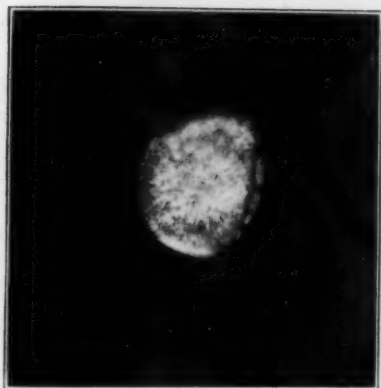


FIG. 1. Colony of *Coccidioides immitis* on agar.



FIG. 2. Culture growth showing long, septate, branching hyphae (x 200).

human cases on record prior to June 1, 1931, approximately 90 per cent originated in the state of California, according to the California Department of Public Health.³

History: Thirty-five Hereford steers approximately two years of age, which were raised in New Mexico and fed in Arizona, were slaughtered for food purposes in Denver, July 11, 1935. Upon postmortem inspection conducted by Drs. H. L. Shorten and W. D. Fountain, of the Meat Inspection Division, B. A. I., one steer showed an abscess of the posterior mediastinal lymph-gland. No other lesions were observed in the carcass. The lesion being atypical of actinomycosis, coccidioidal granuloma was suspected and the specimen was submitted to the laboratory for diagnosis.

Gross description: The abscess was the size of a hen's egg and well encapsulated. Within the abscess were several rather large pockets, containing a creamy tenacious pus. The inner abscess wall presented a corrugated surface.

Bacteriology: Cover-slip preparations of the purulent material revealed a number of spherical bodies with a double-contoured wall and containing granular protoplasm. These bodies measured 10 to 40 microns in diameter. Uncontaminated cultures of a white cotton-like mold were obtained on meat-infusion agar after incubation at 37° C. for 48 hours (fig. 1). In cultures the fungus grows as long septate branching hyphae (fig. 2). Animal inoculation was not resorted to, since the bacteriologic and histologic findings, in the opinion of the authors, were sufficient to make a positive diagnosis in this case.

Histology: Sections stained with hematoxylin-eosin show an abscess surrounded by a thick fibrous capsule. The cellular reaction adjacent to the fibrous wall consists of epithelioid cells, giant-cells and lymphocytes, strongly resembling a tuberculous process. A few eosinophiles also are present. A number of spherical bodies with a double-contoured capsule are seen free in the tissue, while others are within giant-cells (figs. 3 and 4). Sections of the pus also reveal the presence of the parasites. Some of the larger parasites show a strong affinity for eosin. An occasional organism shows a ruptured wall. The abscess appears to be invading portions of the fibrous capsule and destroying the normal lymphoid tissue. Within the inflammatory area in the abscess wall are seen many newly formed blood-vessels and fibroblasts, suggesting a granulomatous structure.

Comments: A study of cases of coccidioidal granuloma in both man and animals in the United States reveals a decided

concentration in California. There are, however, eleven other states reporting a total of 16 cases in man, among them being two cases reported in Arizona.³ Aside from the occurrence of 20 cases in California cattle and one in Colorado, this report

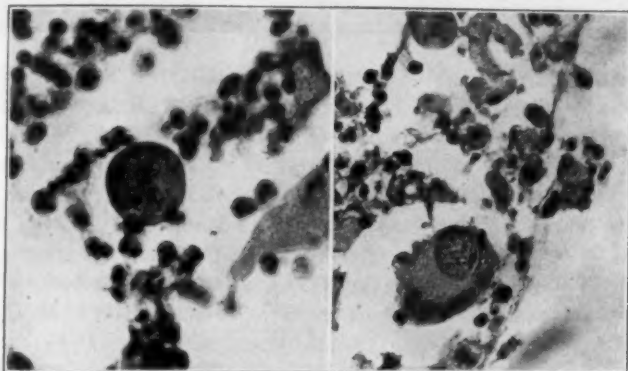


FIG. 3 (left). Spherical parasite, with a double-contoured capsule, containing granular protoplasm (x 500).

FIG. 4 (right). Parasite within a giant-cell (x 500).

establishes another locality for this disease in animals. The history of this case suggests the possibility that the infection was acquired in southwestern New Mexico or Arizona.

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Candid Photographs Feature Doctor Dailey

Every day the candid camera of the *Boston Traveler* photographs scenes and happenings of interest in and around Boston. The May 13 issue of the *Traveler* devoted a large part of its second page to a series of candid photographs showing Dr. Hugh F. Dailey (U. P. '13), chief veterinarian at the Angell Memorial Hospital, Boston, and his assistant, "bringing the blessings of science to the aid of some stricken fellows." The "fellows" are two dogs and a robin that are shown receiving treatment from Dr. Dailey. The robin liked the care he received so much that now he refuses to be released.

REVIEWS



VETERINARY MILITARY HISTORY OF THE UNITED STATES, With a Brief Record of the Development of Veterinary Education, Practice, Organization and Legislation. Louis A. Merillat, Lt. Col., Vet.-Res.; Chief Veterinarian, First Army, American Expeditionary Forces, and Delwin M. Campbell, Lt. Col., Vet.-Res.; Editor, *Veterinary Medicine*. Sponsored by the American Veterinary Medical Association. 2 vol., 1173 pages, with 476 illustrations. Veterinary Magazine Corporation, Chicago, and Haver-Glover Laboratories, Kansas City, Mo., 1935. Price, \$10.

Written in excellent and pleasing diction and printed on good paper and in type that is large and easily read, the authors have given the veterinary profession what, in our opinion, is the outstanding veterinary contribution of the decade.

Few, if any, who have the privilege of reading this work ever will appreciate the gigantic task the authors have completed. Were it not for their keen, unselfish interest in the subject that urged them to devote all their spare moments for several years, reading volume upon volume of age-yellowed books and journals, most of which was irrelevant matter, spending hours and days seeking the explanation of some reference or footnote, checking and re-checking the authenticity of available material, this work never would have appeared.

Although it long has been known that Drs. Merillat and Campbell were the logical ones to write on the subject of veterinary history in our country, their work has proved that they are masters of their subject. As true historians, they have attempted to present bold, ungarnished facts, with a minimum of bias, and it may truthfully be said that they have succeeded, although the facts frequently were embarrassing. Not only are they scholars of history, but primarily, they are practical veterinarians, thus presenting a perspective that otherwise could not have been approached.

The title is misleading. Although the work covers the military aspect the more completely, nevertheless it gives us, by far, the best available work on the civil veterinary history of our country.

Since the purchaser obtains far more than the seller promises through the title of the book, no complaints should be forthcoming on this score.

This new work fills a gap in American veterinary literature which, until now, has been incomplete. We have stated on several occasions, before veterinary meetings, that there is no profession whose members are as ignorant of the history and traditions of their calling as the veterinary profession. This ignorance is not entirely the fault of the individual, since no works have been available on the subject, except a few sketchy articles, and these, for the most part, cover only certain phases of our profession. No longer is this excuse available.

Volume I contains 620 pages, divided into six books, and is profusely illustrated (318 halftones and etchings, many of them of groups). In addition to a great number of relevant photographs, there are scores (one is tempted to say hundreds) of pictures of veterinarians who served in the late war.

Book One is called the introduction and covers a variety of subjects leading to the basic one. In Chapter I, the authors give us a brief history of the development of veterinary medicine from early times to the introduction of the art into our own country. The sin of omission, rather than that of commission, we feel has been committed here. Not wishing in the least to belittle the French workers whom we admire and respect, it is our opinion that due to the space given them, others, particularly the Italians, have been shorn of some credit. This chapter contains, for reference, a list of historical works published in English. In this way the authors have very adeptly avoided the necessity of much repetition. In like manner have they, in tabulated form throughout the volume, given a list of works published in the United States up to 1900, the founding of foreign veterinary colleges, a history of each of the present colleges of the United States and Canada, with the number of students graduated to date (supplied by Dr. J. P. Foster), a list of the meetings of the A. V. M. A., a list of the state veterinary associations and the dates of their organization, and several other matters.

Chapter II also is worthy of note. Captioned, "We, the Unready," is an article that should be read by every American citizen. We have never seen the folly of unpreparedness and pacifism discussed so well in so brief a space. The succeeding chapters of the introduction make very interesting reading concerning the early development of our live stock industry, and enlighten one on the history and use of the cavalry. One is surprised that veterinary authors should take the liberty of so

severely criticizing such an old and respected establishment as the professional United States Army, but one must admire their boldness and their knowledge of the subject. Those who are prone to criticize the weakness, greed and avarice of our present generation and, to prove their point, bring up the political scandals of our day, would do well to ponder over this book. They will find that human nature has changed but little through the generations.

Book Two covers the years 1792-1860. In it, we are told of the army veterinary service during the period under discussion. Also, a clear picture of the "old" Army is given. Not the least interesting is the story of civil veterinarians and their practices of the time.

Book Three, 1861-1879, describes the veterinary service, or, more properly, the lack of it, during the Civil War and the period succeeding it. It carries the picture to 1879, when Congress passed a measure requiring each future candidate for the Army to be a graduate of a recognized veterinary college. In this period also, we are shown the "Development of an American Veterinary Profession." This particular chapter describes the childhood period of our profession, one of the most important phases of its development, bringing to us the establishment of colleges, associations, and so forth.

Book Four unfolds the story from 1879 to 1901. To quote: "This period . . . includes the years that elapsed between the adoption of the plan of appointing only graduate veterinarians to the position of army veterinarian, and the time when, by Act of Congress, army veterinarians no longer received 'the rank and allowances of a sergeant major and pay of \$75.00 a month,' but were given the 'pay and allowances of a second lieutenant.'" After reading of the many determined but futile efforts of the army veterinarian to improve his lot, one must admire his persistence. Men of less determination would have given up long before the end of this period which resulted in only moderate gains. A chapter by Col. J. P. Turner is very interesting. Briefly, it gives a first-hand picture of the status and the experiences of an army veterinarian from 1890 to 1918. A chapter devoted to the civil veterinary history of the 80's and the 90's is most complete. This period, perhaps the most significant of our profession, is aptly called by the authors the "adolescent period."

Book Five, 1901-1916. In this book, the plight of the army veterinarian is shown, culminating in final recognition on that eventful day in 1916, when Congress granted him the status of an officer and a gentleman. In this part, the subject of veterinary education is well covered. The teaching of farmers to be their

own veterinarians by our commonwealths, through the instrumentality of agricultural colleges and their representatives (farm advisers), is vigorously assailed. This subject has been approached to a greater or lesser degree throughout the entire volume.

The last book of the volume closes with the story of the veterinary activities of the World War in the United States and demobilization. It embraces the years 1916-1920. Of interest in this part are two chapters, one written by Lt. Col. C. J. Marshall, on "Experiences in the Surgeon General's Office," and another, by Major C. E. Cotton, on "Experiences of a General Veterinary Inspector."

Volume I is a sound piece of workmanship which should be read by every veterinarian and veterinary student. In fact, it is hard to conceive of anyone in or out of the profession who would not benefit by its reading.

J. M. A.

(A review of Volume II, by the same reviewer, will appear in the December issue of the JOURNAL.—EDITOR.)

PUBLICATIONS RECEIVED

Diseases of Brooder Chicks. Erwin Jungherr. (Bul. 202, Storrs, Conn., Agr. Exp. Sta., May, 1935. pp. 56. Illus.)

Note on the Variations in Area and in Staining Intensity of Red Blood Cells and on Their Correlation. Alfred Savage, C. H. Goulden and J. M. Isa. Reprint from *Can. Jour. Res.*, xii (1935), pp. 803-811.

The Diagnosis of John's Disease by the Use of Johnin. F. C. Minett. Reprint from *Jour. Comp. Path. & Therap.*, xlviii (1935), 2, pp. 126-137.

Tuberculin, Johnin and Mallein Derived from Non-Protein Media. E. A. Watson. Reprint from *Can. Pub. Health Jour.*, June, 1925. pp. 208-275.

The Relief of Animal Suffering. Sir Frederick Hobday. Reprint from *The Fight Against Disease*, xxiii (1935), 3, pp. 1-12.

Report on the General Health of the Stock of Antigua for the Year 1934. L. R. Hutson, Veterinary Surgeon. (Saint John, Antigua, Leeward Islands, 1935. pp. 3.)

Theobald Smith. Simon Henry Gage. Reprint from *Corn. Vet.*, xxv (1935), 2, pp. 206-228.

National Veterinary Medical Association of Great Britain and Ireland. Program of the Annual Congress at Belfast, July 29-Aug. 2, 1935, and Annual Report, 1934-35. (London, 1935. pp. 154.)

Some Aspects of Red-Water in Cattle. F. T. Harvey. Paper presented at 53rd Annual Congress, N. V. M. A. of Great Britain and Ireland, July 29-Aug. 2, 1935. pp. 8.

Coccidiosis in Bovines and Poultry. H. G. Lamont. Paper presented at 53rd Annual Congress, N. V. M. A. of Great Britain and Ireland, July 29-Aug. 2, 1935. pp. 12.

ABSTRACTS



CONTRIBUTION À L'ÉTUDE DE L'ACTION PATHOGÈNE DE BRUCELLA ABORTUS POUR LE CHEVAL. Essai sur la pathogénie de la brucellose équine (Contribution to the Study of the Pathogenic Action of *Brucella Abortus* in the Horse. Test on the Pathogenesis of Equine Brucellosis). L. Panisset and P. Delbé. *Bul. de l'Acad. Vét. de France*. viii (1935), 2, pp. 119-124.

As the knowledge of equine brucellosis has already been richly documented, the authors continue their studies solely of the pyogenic action of *Br. abortus* in the horse begun in 1932 (*Rev. Gén. de Méd. Vét.*, 1932, p. 670). Although the presence of the organism in cysts and bursae, which constitute the essential manifestations of brucellosis in the horse, is demonstrable, it has not been possible up to the present time to reproduce the affections as they are observed under natural conditions. Panisset and Delbé report their experimental work done on this question.

Intravenous inoculations of living cultures are negative, at least during the days immediately following the injections. As Hoeden had already shown, repeated ingestion of the living organism provokes some general symptoms with hyperthermia; the organism can be recovered in the blood and antibodies rapidly appear in the serum, but months later the autopsy reveals neither lesions nor the presence of the organisms in the various organs.

Tests after creating an inflammatory focus: Ten cubic centimeters of a sterile mixture of porphyzied pumice and oil (65:10) was injected into the left scapular space. Several hours after the injection, the temperature of the horse rose to 39° C. (102.2° F.) but dropped to normal on the following day, when a hot, painful swelling and some lameness appeared. Forty-eight hours after giving the pumice-oil injection, the horse received a strong dose of *Br. abortus* in the jugular vein. The same night the temperature rose to 39.8° C. and the next morning 38.9° C. During the following 15 days, the temperature oscillated around 38.2, being slightly higher in the evening than in the morning. Antibodies appeared in the blood on the sixth day. The reaction to agglutination was positive at 1:330 on the

sixth day, 1:1,000 on the eighth day, and 1:10,000 on the tenth day. It remained at this high level 12 days and then dropped to 1:1,500 where it remained for a month. The inflammatory symptoms provoked by the pumice-oil material subsided very gradually, to disappear entirely in a month, leaving no lesion. Except for a slight inappetence after the virulent injection, the general condition of the horse was not changed.

Effect of reinfection: Two months after the intravenous inoculation, the withers was inoculated subcutaneously with 8 cc of a diluted emulsion of *Br. abortus*. This inoculation was followed by quite a marked reaction. The temperature rose from 37.4° to 39.3° C. during the next day and dropped to normal on the fourth day. The thermic reaction was associated with inappetence and profound depression, and important local phenomena ensued. The withers was hot, tumefied and sensitive, and on the following day an edema extended from the summit of the withers to the arm and later descended over the forearm, carpus and cannon. Ten days after the inoculation, fluctuation appeared over the inflamed region and an aseptic puncture gave issue to a creamy pus containing an abundance of Bang's bacilli. In 16 days the abscess opened spontaneously, discharging a pus more fluid than that drawn off by the puncture. In 15 days the abscess had healed. Attempts to revive the inflammation by means of binding cultures to the scarified skin of the region failed.

It was then decided to make successive inoculations of living cultures two months after the first one. The effect of the second injection (hypodermic) was more brutal and rapid than the first. The general reaction was particularly severe, the temperature rising from 39 to 40.5° C. between the sixth and tenth hours. The local reaction was an edematous injection the size of the hand. Three days later, an abscess formed at the point of inoculation, discharging a very white, thick pus. The abscess healed in eight days.

In the next test, the authors attempted to reproduce the localization by producing a lesion and practicing an inoculation at the same site. Ten cubic centimeters of blood was drawn from the jugular with a syringe soiled with *Br. abortus*, and this was injected immediately into the scapular space. The temperature rose to 39° C. but there was no local reaction until the next day when the site became hot and slightly edematous, and agglutination was positive at 1:100. Several days later, the horse received another subcutaneous inoculation of the bovine strain on the other side of the withers. By night the temperature rose to 39.6° and on the next day the site was hot, inflamed, and painful, and

the horse remained down most of the time. A fluctuating swelling the size of a fist developed. The contents revealed by puncture was clear and oily and resembled synovia. The horse remained down several days and died. The autopsy disclosed a pouch containing 50 cc of a sero-albuminous liquid which was also dispersed in the scapular space between the trapezium and rhomboideus muscles and inward to the neck ligament and dorsal spines. The lesions markedly resembled those of the natural affection and the liquid was similar to that contained at the onset of fistulous withers.

The authors regard this research as merely another step in the study of equine brucellosis and a possible help in future studies of the question.

L. A. M.

LA VALEUR COMPARÉE DES DIVERS ALIMENTS PROTEIQUES DANS LA CROISSANCE (The Comparative Value of Protein Feeds in Growth). Emile-F. Terroine and Miss Simone Valla. *Abst. Acad. des Sci.*, Jan. 23, 1933. *Rev. Vét. et Jour. de Méd. Vét.*, lxxxvii (1935), p. 244.

It is well known that protein material is composed principally of amino-acids. The organism appropriates certain amino-acids for its proper tissues to the exclusion of others that are not necessary to it. It is thus foreseen that all albuminoid materials do not have the same nutritive value.

In their work, the authors concerned themselves not with comparing the already well-known alimentary value of various products but with specifying the quality of proteins each natural feed contained. They used swine weighing 15 kilos. Each experiment comprised three periods of a week each, during which feeds rich in glucides, salts and vitamins containing the same quantity of nitrogen—about 8 grams—were used. The periods differed only in the nature of the nitrogenous feed used: Skimmed milk during the first and last weeks and the feed to be studied during the second.

They calculated the coefficient of digestibility ($N \text{ absorbed}/N \text{ ingested} \times 100$), the coefficient of retention ($N \text{ retained}/N \text{ absorbed} \times 100$), and the coefficient of practical utilization ($N \text{ retained}/N \text{ ingested} \times 100$).

The experiment revealed that among the feeds of animal origin, the coefficient of utilization of total albumens of milk is 62.7 and that of the white of egg is 44.2. For the cereals, barley flour showed a coefficient of 43.5 and oats, 19. Among the legumes,

soy bean flour had a coefficient of 47.1 and bean hay, 24.1. There is considerable economic importance in these findings.

L. A. M.

THE DIAGNOSIS OF JOHNE'S DISEASE BY THE USE OF JOHNIN. F. C. Minett. Jour. Comp. Path. and Therap., xlviii (1935), 2, pp. 125-137.

In this article an account is given of 59 cattle, of which 53 had reacted—many of them on more than one occasion—to the double intradermal test, using concentrated johnin prepared on a Sauton synthetic medium. Thirty-nine of the 53 were conclusively proved postmortem to be infected with Johne's disease, while there was presumptive evidence of this infection either from postmortem examination or from history of the case in eleven of the remaining 14. In three early cases a positive diagnosis was reached by cultural methods only, the examination of films and of sections of the intestine being negative. Six of the 59 animals did not react to johnin but were found to be affected with Johne's disease on postmortem; of these, three were tested once only and four were at an advanced clinical stage. Post-mortem examination for tuberculosis indicated that the reactions to johnin were unconnected with tuberculosis infection.

Repeat tests with johnin on a number of the animals showed much variation in the degree of local response, a result which is attributed to variations in the allergic state.

F. C. M.

SUR LE PRÉMUNITION DE L'ENTÉRITE PARATUBERCULEUSE DES BOVIDES (On the Premunition of Cattle against Johne's Disease). H. Vallée, P. Rinjard and M. Vallée. Rev. Gén. de Méd. Vét., xliii (1934), pp. 777-779.

Subcutaneous injections of *B. paratuberculosis* are known to be harmless, even when not attenuated. A dose of vaccine consists of 5 to 10 mg of living cultures of this organism, unmodified, but held in suspension in non-absorbable material such as vaseline and porphyryzed pumice stone. An inflammatory nodule appears at the site of injection where it remains for a long time. The nodule becomes sclerotic and insensitive and, as long as it persists, the vaccinated animal should be premunized against the disease, that is, immune to a subsequent infection. The harmlessness of the vaccination is incontestable. Of 35,341 cattle treated by this method, there were no accidents of consequence, and the animals, although kept in the same environment, resisted

the disease eight months, one year, two years, and in an exceptional case, six years.

The efficacy of the method was absolute on 133 farms badly contaminated. The only failures observed were in animals where the "protective nodule" disappeared by resorption or suppuration, due to the animals having already been infected.

This inoffensive and effective method should be employed in combating Johne's disease, together with promptly sacrificing the clinical cases which are the source of the contagion.

L. A. M.

EFFICACY OF ANTHRAX BIOLOGICS IN PRODUCING IMMUNITY IN PREVIOUSLY UNEXPOSED ANIMALS. W. S. Gochenour, H. W. Schoening, C. D. Stein and W. M. Mohler. U. S. Dept. Agr., Tech. Bul. 468 (1935).

Between 1925 and 1932, a number of commercially prepared anthrax biologics were tested to determine their immunizing value, cattle, horses and sheep being used as test animals. In these tests, which for the greater part were conducted separately, anthrax bacterin (washed culture), anthrax-spore vaccine (intradermic), anthrax-spore vaccine in saponin solution, anthrax-spore vaccine (single injection) and anthrax-spore vaccine (double injection) possessed high immunizing values. Anthrax aggressin exhibited some immunizing value, whereas anthrax bacterin (whole culture) produced comparatively little. A total of 13 tests were made with 88 principal animals and 101 controls.

In 1933 and 1934, a series of comparative tests were made of six commercially prepared anthrax biologics to determine their relative safety, sensitizing effect, rapidity of immunity production, and the degree and duration of immunity which they produced under experimental conditions in which the test animals (sheep) had had no previous contact with anthrax infection. The products tested were antianthrax serum, antianthrax serum and anthrax-spore vaccine in combination, anthrax-spore vaccine (single injection), anthrax-spore vaccine (intradermic), anthrax-spore vaccine in saponin solution, and anthrax bacterin (washed culture). This information was sought through a comparison of the immunities produced by those biologics at 4, 16, 108, 155, 300, and 365 days after vaccination. The tests were divided into three experiments, 250 sheep being used, 71 in the titration of the exposure cultures, 149 as principals, and 30 as controls.

None of the biologics produced any ill effects in the test animals. None of the products produced any evidence of sensitiza-

tion to anthrax. Antianthrax serum and anthrax-spore vaccine (intradermic) were the most rapid in producing immunity, complete protection having been established at four days after vaccination.

Each of the biologics produced complete protection for some time during the testing period. Antianthrax serum produced the shortest immunity—less than 16 days duration—whereas anthrax-spore vaccine (single injection) and anthrax-spore vaccine (intradermic) produced the longest immunity, being complete at 300 and 360 days after vaccination. Anthrax-spore vaccine (intradermic) produced the most consistent immunity, there being 100 per cent survivals at 4, 16, 108, 300, and 360 days after vaccination and 83 per cent at 155 days.

W. S. G. *et al.*

COMPARATIVE RESISTANCE OF FIVE BREEDS OF CHICKENS TO THE NEMATODE *ASCARIDIA LINEATA*. J. E. Ackert, L. L. Eisenbrandt, J. H. Wilmoth, B. Glading and I. Pratt. Jour. Agr. Res., 1 (1935), 7, p. 607.

Heavy-breed varieties, Rhode Island Reds, White Plymouth Rocks and Barred Plymouth Rocks, were more resistant to parasites than were the lighter breeds, White Leghorns, Buff Orpingtons and White Minorcas. A strain of heavy White Minorcas proved to be more resistant to *Ascaridia lineata* than a lighter strain of the same breed with different genetic constitution. Factors in the differences in resistance appear to include greater utilization of nervous energy by the more susceptible breeds, possible differences in strains within breeds, and a greater mortality or tolerance on the host breeds. The data were derived from experiments on 1,351 chickens given the same number of eggs from the nematode *Ascaridia lineata*. The criteria for judging the resistance were the average number and length of the parasites from each group of chickens under comparison.

Maine Examining Board Reorganizes

The Maine State Board of Veterinary Examiners has been reorganized following the appointment of Dr. W. E. Fairbanks, of Lewiston, to the Board. Dr. Fairbanks succeeded Dr. A. J. Neal, of Bangor. Dr. P. R. Baird, of Waterville, who has been a member of the Board since 1918, has been elected chairman, and Dr. C. L. Ryan, of Dexter, who was appointed to the Board in 1927, has been elected secretary-treasurer.



Regular Army

PROMOTIONS

The promotion of the following-named officers of the Veterinary Corps with rank from August 1, 1935, is announced.

First lieutenants to be captains:

Arvo Theodore Thompson
Harvie Russell Ellis
Ralph William Mohri
Austin Taylor Getz
Wesley Watson Bertz
Edgerton Lynn Watson
George Townley Price

Second lieutenants to be first lieutenants:

Richard George Yule
Wayne Otho Kester
Robert Arthur Boyce, Jr.
Clarence Leonard Taylor
William Edwin Jennings
Curtis William Betzold
James Bernhard Nichols
Albert Arthur Roby, Jr.
Andrew Jesse Sirilo
Daniel Stevens Stevenson
Ray Swartley Hunsberger
William Francis Collins

The promotion of 1st Lt. Russell McNellis to the grade of captain with rank from August 3, 1935, is announced.

The promotion of 1st Lt. Richard G. Yule to the grade of captain with rank from August 18, 1935, is announced.

Captain Ralph W. Mohri is relieved from duty at Fort Riley, Kan., effective in time to proceed to New York, N. Y., and sail on or about December 31, 1935, for the Philippine Department, for duty.

Captain Arvo T. Thompson is assigned to duty at Fort Riley, Kan., upon completion of his tour of foreign service in the Philippine Department.

Lt. Col. Jesse D. Derrick is relieved from further assignment and duty at Ft. Des Moines, Iowa, will proceed to Omaha, Neb., and report to the commanding general, Seventh Corps area, for duty at his headquarters and additional duty as attending veterinarian at Fort Omaha, Neb., and Fort Crook, Neb.

Major John W. Miner is relieved from duty at Fort Riley, Kan., will proceed to Fort Douglas, Utah, and report to the officer in charge, purchasing and breeding headquarters, for duty and is assigned to additional duty as attending veterinarian at Fort Douglas and at the University of Utah.

Major Claude F. Cox is relieved from duty with the purchasing and breeding headquarters, Fort Douglas, Utah, and from additional duty as attending veterinarian at Fort Douglas and at the University of Utah, will proceed to Fort Des Moines, Iowa, and report to the commanding officer for duty.

APPOINTMENTS

As a result of a recent examination, the following candidates were found qualified for appointment as first lieutenants of the Veterinary Corps of the Regular Army:

McGinnis, Velmer W.Ord, Neb.
Rust, John H., 3d23 Forest St., Wellesley Hills, Mass.
Trum, Bernard F.61 Washington St., Natick, Mass.
Tekse, Lloyd C.Glencoe, Minn.
Cady, Duane L.Arlington, Neb.
Millenbruck, Edwin L.Herkimer, Kan.
Jones, Thomas C.1219 Warren St., Boise, Idaho
Carll, Walter T.65 Nichols St., Bridgeton, N. J.
Kelley, Donald C.1121 Washington St., Great Bend, Kan.

There are at present seven vacancies in the Veterinary Corps. Appointments to fill these vacancies will be tendered the first seven on the above list. The remaining two will be considered for subsequent vacancies.

Veterinary Reserve Corps

PROMOTIONS

To

Coyner, David Floyd.....Major...164 Yosemite Ave., Fresno, Calif.
McCreary, Virgil Dudley....1st Lt....P. O. Box 405, Brewton, Ala.

NEW ACCEPTANCES

Allen, Bertram Verlou....2nd Lt...914 Harmer St., Fort Wayne, Ind.
Cook, Victor Jos.....2nd Lt...334 Federal Bldg., Oklahoma City, Okla.
Dorgan, Wm. Francis.....2nd Lt...2233 Neil Ave., Columbus, Ohio.
Evans, Wm. Morris.....2nd Lt...511 E. Buffalo St., Ithaca, N. Y.
Hasson, David Samuel.....2nd Lt...210 E. 5th St., Mulberry, Kan.
Leach, Benjamin Francis...2nd Lt...East Fairfield, Vt.
Leenerts, Theodore Henry..2nd Lt...Box 2522, Reno, Nev.
Milks, Clifford Howard....2nd Lt...Newark Valley, N. Y.
Mouw, John Englen Bertus..2nd Lt...Edgerton, Minn.
Prchal, Charles Frank.....2nd Lt...4112 S. 12th St., Omaha, Neb.
Werrin, Nathaniel.....2nd Lt...1104 N. 41st St., Philadelphia, Pa.
Badger, Jos. Edward.....2nd Lt...North Hackensack, N. J.
Bean, Clyde Wm.....2nd Lt...Route 1, Box 77, Littleton, Colo.
Bean, Robert Lester.....2nd Lt...Route 1, Box 77, Littleton, Colo.
Christensen, Nels Frank...2nd Lt...Estes Park, Colo.
Goodfellow, Wm. Allison...2nd Lt...905 W. Loucks, Sheridan, Wyo.
Hummer, Robert Leo.....2nd Lt...312 W. Church Ave., Knoxville, Tenn.
Jerstad, Arthur Clifford...2nd Lt...Route 2, Box 409, Tacoma, Wash.
Johnson, Harry Wm.....2nd Lt...206 Wood St., Urbana, Ill.
Kenaston, Glenn Harry...2nd Lt...5417 N. E. 33rd Ave., Portland, Ore.
Koch, Bernard.....2nd Lt...141 Hawthorne Ave., Newark, N. J.
Kramer, Wm. Newton.....2nd Lt...R. R. 2, Davids Church Road, Dayton, Ohio.
Linzlnmeir, Chas. Bertram..2nd Lt...Marysville, Ohio.
Live, Israel.....2nd Lt...3918 Pine St., Philadelphia, Pa.
McGee, Lucius Elijah.....2nd Lt...334 Federal Bldg., Oklahoma City, Okla.

PROMOTIONS (con.)

To

Milliken, John Charles.....2nd Lt...1141 S. Emerson, Denver, Colo.
 Peters, Max Robison.....2nd Lt...Redkey, Ind.
 Reid, Jos. Jenkinson.....Capt...204 W. T. Waggoner Bldg., Fort
 Worth, Tex.
 Sundberg, Carlton Eugene..2nd Lt...Linn Grove, Iowa.
 Tuttle, Martin Lyon.....2nd Lt...2788 Indianola Ave., Columbus,
 Ohio.
 Wilder, Clifford Walter....2nd Lt...Chatham, N. Y.
 Younce, Ralph Ray.....2nd Lt...P. O. Box 97, Wellington, Colo.

OFFICERS ON ACTIVE DUTY

Name *Rank* *C. C. C. District or Station*

FIRST CORPS AREA

NEW APPOINTMENT

Leach, Benjamin F.....2nd Lt...Hq. 1st C. A., Boston, Mass.

SECOND CORPS AREA

No change.

THIRD CORPS AREA

NEW APPOINTMENT

Perella, Dorwin H.....2nd Lt. Hq. 3rd Corps Area, Baltimore, Md.

FOURTH CORPS AREA

NEW APPOINTMENTS

Thiele, Arthur R.....2nd Lt...Fort Bragg, N. C.
 Greene, James E.....2nd Lt...McPherson, Ga.

FIFTH CORPS AREA

No change.

SIXTH CORPS AREA

No change.

SEVENTH CORPS AREA

No change.

EIGHTH CORPS AREA

No change.

NINTH CORPS AREA

NEW APPOINTMENTS

Kermen, William R.2nd Lt...Ft. MacArthur, Calif.
 Geisler, Richard E.2nd Lt...Pres. of Monterey, Calif.
 Townsend, Jay G.Major..Vancouver Barracks, Wash.
 Mace, Don L.2nd Lt...Pres. of San Francisco, Calif.
 Hartzell, Harold P.....2nd Lt...Ft. Douglas, Utah.
 Castleberry, GuyCapt...Pres. of San Francisco, Calif.

CHANGE IN ADDRESS

From

To

1st Lt. Fred J. Bolender. Ft. Lewis, Wash.....Ft. Missoula, Mont.
 2nd Lt. Thomas G. Jones. Pres., San Francisco, Calif. Ft. George Wright,
 Calif. Wash.

COMMUNICATION

THE MEANING OF "VETERINARY SERVICE"

TO THE EDITOR:

After reading the discussion of my paper, "The Veterinary Service of the United States," published in the October issue of the JOURNAL, it seems that I have not made clear just what constitutes the veterinary service of our country. When Doctor Wisnicky was prompted to defend the state regulatory service of his state, he may have left the impression that this particular unit of the veterinary service is symbolic of the whole, if not the whole itself, when in fact these regulatory services, as they have been called in recent years, are but a small part of the total service in any state.

What was meant by "veterinary service" is the sum total of what is being done for the health of domestic animals. It includes the work of the owners themselves; the legal and illegal non-graduates; the graduates of veterinary colleges wherever engaged; the farm advisers who meddle with animal diseases; the veterinary colleges; the research workers of the agricultural experiment stations; the poultry disease laboratories and schools; the commercial laboratories serving both the veterinary profession and the farmers; the chicken doctors, hog vaccinators, etc.; the federal Bureau of Animal Industry and the Veterinary Corps of the Army; and the state regulatory services. Why not look at the woods instead of just one or two of the trees?

The state regulatory services were not singled out nor criticized. They were not discussed in the paper read, except to say that they were operated under different regulations, which is a mere statement of fact, not a criticism.

It would be unfortunate if the veterinary profession, upon whose shoulders rests the responsibility of forming a competent veterinary service, does not stop to survey the whole mural.

Very truly yours,

L. A. MERILLAT.

Chicago, Ill., Oct. 14, 1935.

AMERICAN VETERINARY MEDICAL ASSOCIATION

Proceedings of the Seventy-Second Annual Meeting,
Oklahoma City, Okla., August 27 to 30, 1935

Conference of Extension Veterinarians

A special conference of veterinarians interested in veterinary extension work was held at the Skirvin Hotel, Oklahoma City, August 27, 1935, in conjunction with the annual convention of the A. V. M. A. The following were in attendance:

Dr. Robert Graham, University of Illinois, Urbana, Ill.
Dr. B. J. Killham, Michigan State College, East Lansing, Mich.
Dr. C. D. Lowe, U. S. Department of Agriculture, Washington, D. C.
Dr. E. N. Stout, Colorado State College, Fort Collins, Colo.
Dr. R. S. Sugg, Alabama Polytechnic Institute, Auburn, Ala.
Dr. E. A. Tunnick, Montana Agricultural College, Bozeman, Mont.
Dr. J. W. Lumb, Kansas State College, Manhattan, Kan.

The meeting was called to order by Doctor Lowe, acting as temporary chairman. Extension activities were discussed in a general way by all of those present. The methods of extension procedure in the different states were outlined. Some of the factors hindering extension activities were mentioned. It was brought out that veterinary extension programs in the various states differ widely not only as to subject matter and projects carried on, but also in regard to the methods of procedure and the plans of work. It was suggested that methods of procedure and plans of work be exchanged by the various workers so that all may observe what is being done in the different states.

The group was unanimous in expressing the opinion that meetings of this kind should be fostered. It was suggested that at the next meeting a short program be prepared, and that some member of the A. V. M. A. not engaged in extension work be asked to address it.

Doctor Lowe was asked to write up an outline of general veterinary extension procedure to be sent to all veterinary extension workers.

Dr. B. J. Killham, East Lansing, Mich., was elected president, and Dr. J. W. Lumb, Manhattan, Kan., was elected secretary of the group for the ensuing year.

J. W. LUMB, *Secretary.*

Major General Charles Ranson Reynolds*

Major General Charles R. Reynolds, who was appointed Surgeon General of the United States Army on June 1, 1935, was

*Elected an honorary member of the A. V. M. A., August 29, 1935.



MAJOR GENERAL CHARLES RANSON REYNOLDS
Surgeon General of the U. S. Army

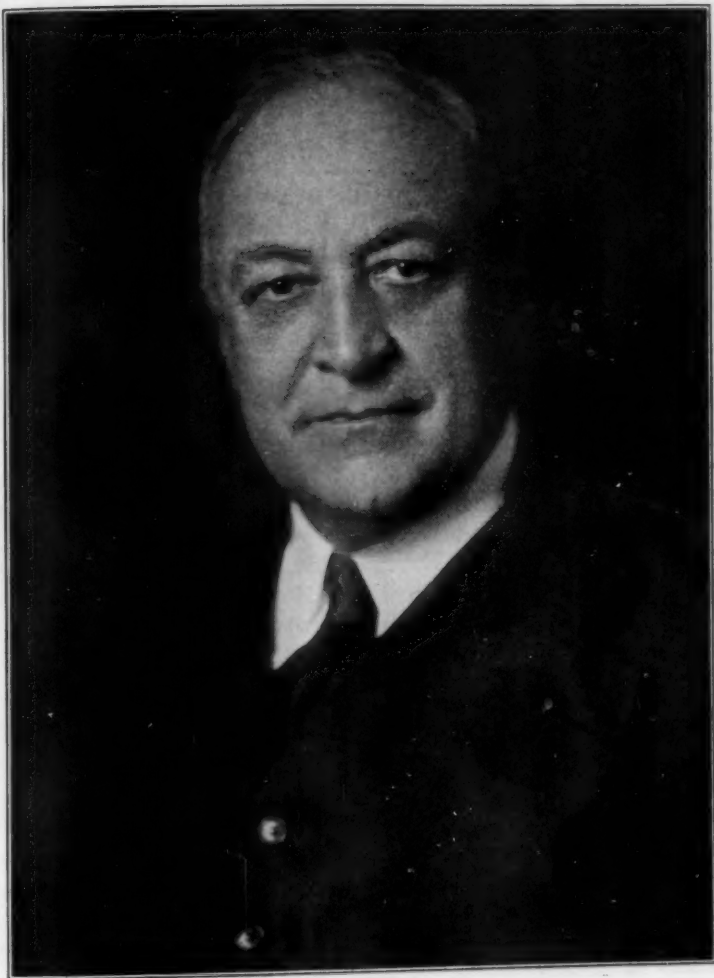
born in Elmira, N. Y. He attended the public schools of his native city, the University of Michigan and the University of Pennsylvania. He received his degree in medicine from the latter institution in 1899 and served his internship at Mercy Hospital, Pittsburgh, and at the Philadelphia General Hospital (Blockley). He entered the Army in September, 1900, and has served in all grades from first lieutenant to major general of the Regular Army Medical Corps. This service was at various stations in the United States, including the general hospital at Washington Barracks, D. C.; the Walter Reed General Hospital, Washington, D. C.; Fort Sam Houston, Texas, as well as in the Philippines and Hawaii, and with the American Expeditionary Forces in France.

Much of General Reynolds' service has been devoted to military training. He commanded the Hospital Corps Company of Instruction at Washington Barracks and was instructor in Medical Department Administration and Field Service at the Army Medical School from 1908 to 1913 and Commandant of the Medical Field Service School at Carlisle Barracks, Pa., from 1923 to 1931.

At the outbreak of the World War, General Reynolds was chief of the Surgical Service at the Department Hospital at Honolulu. Upon his return to the United States, he became senior instructor at the Medical Officers' Training Camp at Fort Riley, Kan., and later served as division surgeon of the 77th Division at Camp Upton, L. I., and in the A. E. F., where he was promoted to chief surgeon of the Sixth Corps and chief surgeon of the Second Army in France on the staff of Lieutenant General Robert L. Bullard.

General Reynolds was awarded the Silver Star citation for gallantry in action at Mount Dajo in the Moro Campaign of 1906, the Distinguished Service Medal for meritorious service as chief surgeon of the 77th Division, Sixth Corps, and Second Army during the World War. He is an officer of the French Legion of Honor, a Fellow of the American College of Surgeons, a Fellow of the American College of Physicians, and a member of the Nu Sigma Nu medical fraternity.

Since the World War, General Reynolds served for four years in the office of the Surgeon General as personnel officer and executive officer and for eight years as Commandant of the Medical Field Service School at Carlisle Barracks, Pa. Since 1931, he has been on duty as surgeon of the Second Corps Area at Governors Island, N. Y., on the staff of Major General Dennis E. Nolan.



HENRY W. JEFFERS
President of the Walker-Gordon Laboratory Company

Henry W. Jeffers*

Mr. Henry W. Jeffers has been president of the Walker-Gordon Laboratory Company, of Plainsboro, N. J., since 1918. Before his election to the presidency of the concern, Mr. Jeffers served as manager for 20 years.

Born at Harford, Pa., January 4, 1871, Mr. Jeffers attended Wyoming Seminary at Kingston, Pa., before entering Cornell University. He received his B. S. from Cornell in 1899 and it was as a student at Ithaca that Mr. Jeffers came under the guidance and inspiration of the late Dr. Veranus A. Moore, who taught bacteriology to the agricultural students as a part of their course in veterinary science. While a student under Dr. Moore, Mr. Jeffers devised the plate counter which now bears his name. This device still is standard equipment in many milk-control laboratories.

In 1916, Mr. Jeffers was appointed a member of the New Jersey State Board of Agriculture. He served for a number of years as chairman of the Animal Industry Committee of the Board. It was during this time that the control of animal diseases in New Jersey was placed under the supervision of the newly organized Bureau of Animal Industry, with a veterinarian (Dr. J. H. McNeil) as chief of the Bureau. Mr. Jeffers, along with other leaders in the live stock industry of New Jersey, as well as leading veterinarians of the state, was convinced of the necessity of having animal disease control under veterinary supervision.

During the World War, Mr. Jeffers was a member of the Advisory Board of the U. S. Department of Agriculture and the U. S. Food Administration.

In 1927, Rutgers University conferred upon him the honorary degree of master of science.

Mr. Jeffers is the inventor of the Jeffers Feed Calculator and the Jeffers Rotolactor. Mr. Jeffers always has manifested a keen interest in matters relating to veterinary science and he numbers among his friends many of the early as well as the more recent leaders in the profession.

Many of those who attended the Twelfth International Veterinary Congress, at New York, in 1934, will recall the warm reception given the delegates by Mr. Jeffers and his associates at Plainsboro, upon the occasion of the visit to the Walker-Gordon dairy farms and laboratories there.

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NECROLOGY



WILLIAM HENRY WELCH

Another stalwart member of the veterinary profession has entered that bourn whence no traveller returns. After an illness of almost a year, Dr. W. H. ("Daddy") Welch of Lexington, Ill., passed away at his home shortly after midnight, October 25, 1935. Heart disease, with complications, was the cause of death. He had been practically bedfast for six months.

Dr. Welch was an exemplary character. He was an honor student in college. As a practitioner, he was progressive, alert, clean and ethical. As a citizen, he recognized his responsibilities to the fullest extent. As a public official, he performed his duties without fear or favor. As an association worker he had no peer, for he believed firmly in organized veterinary medicine. As a husband and father, his home life was beautiful.

Born May 7, 1871, near Bloomington, Ill., Dr. Welch received his early education in the local schools and then entered Illinois Wesleyan University and was graduated in 1890. Upon deciding to study veterinary medicine, he entered the Chicago Veterinary College and was graduated with honors with the class of 1892. He immediately located at Lexington, Ill., where he developed a very lucrative practice. He remained a practitioner until 1930, when he was appointed chief veterinarian of the Illinois Department of Agriculture, a position which he held until 1933. While holding this position, Dr. Welch frequently chafed because of the limitations of the authority of his office. On one occasion he referred to the situation by saying that the chief veterinarian of Illinois had "about as much authority as an office boy." It was his firm conviction that Illinois was not making the best use of its veterinary service under the system of which he was then a part.

In connection with his practice, Dr. Welch bred Percheron horses for a number of years. His farm at Lexington was the home of Apollon, considered by many as the greatest son of Besigue. Although always busy professionally, Dr. Welch found time to give to his community in various capacities. For twelve



WILLIAM HENRY WELCH
May 7, 1871—October 25, 1935

years he served as a member of the Board of Education of Lexington and for six years as a member of the City Council. He served as mayor of Lexington for two years (1905-07). He was an active member of the Lexington Chamber of Commerce, a vice-president of the local Chautauqua Association, and at the time of his death was chairman of the Board of Trustees of his church. He was a member of the Library Board and a trustee of the Brokaw Hospital. He took quite an interest in Boy Scout work and was prominent in Masonic circles.

In 1901, Dr. Welch was elected secretary of the Illinois State Veterinary Medical Association. He held this position until 1906, when his colleagues elected him to the presidency of the organization. In 1925 he was again elected secretary of the Association and continued in that office until 1930. During the period 1901 to 1906, Dr. Welch built up the membership of the organization from about 70 members to approximately 300.

Dr. Welch joined the A. V. M. A. in 1917 and, the following year, was appointed A. V. M. A. resident secretary for Illinois, a post which he continued to fill until his election to the presidency, at the Saint Louis meeting in 1922. During the four years that he served as resident secretary, he built up the A. V. M. A. membership in Illinois to a figure never reached before. He served as a member (1919-20) of the Committee on Coöperation of Veterinary Associations; as a member (1922-23) and chairman (1930-31) of the Committee on Policy; as a member (1922-23) of the Committee on Budget; as a member (1924-29) of the Committee on Legislation; and as a member (1925-26 and 1929-30) of the Committee on Resolutions. For the year 1923-24, he served as A. V. M. A. representative to the Horse Association of America.

Dr. Welch was a member of the United States Live Stock Sanitary Association and was an honorary member of the Mississippi Valley Veterinary Medical Association and of the Indiana Veterinary Medical Association. He had served as president of the McLean County (Ill.) Veterinary Medical Association and was a member of the Illinois State Horse Breeders' Association. He was a member of the Undulant Fever Committee of the Illinois State Board of Health.

The funeral was held Sunday afternoon, October 27. The church in Lexington was filled to overflowing by the friends who gathered from far and near to pay their last respects. Veterinarians from all parts of Illinois were present and formed a cortege which accompanied the remains to Colfax, Ill., where interment took place. Dr. L. A. Merillat, of Chicago, a life-long

friend of Dr. Welch, delivered the following eulogy at the services:

As this stricken family, these relatives and many friends gather here to pay their last tribute to the mortal remains of our departed colleague, be assured that the veterinary profession of the United States and beyond mourns with them.

Our profession has lost a beloved member, a sturdy, forceful figure from its councils, and a model of the useful professional man who, in departing this life, leaves behind a rich heritage to his and future generations.

His 43 years of service to this community, this state, this country, and the whole world have been sublime, full of touching sympathy for his colleagues to whom he gave and gave and gave without fanfare or thought of selfish reward.

Within the horizon of Lexington, Doctor Welch was known as the good citizen, the faithful husband and the kind father; in that of our profession, his life was emblematic of the profound student, scholar, gentleman and good fellow, always calm and resolute in the defense of right and the ruthless opponent of wrong.

Throughout the period of his professional life, the literature of our profession is interspersed with his brilliant writings on professional questions concerning the welfare of the American Republic to which he was patriotically devoted. These and his contributions to the science and art of veterinary medicine have not died with him. They are indelibly stamped into history and will be long remembered after the emotions of this sad hour have been forgotten.

At whatever angle the perspective of Doctor Welch's life and work is surveyed, the view is impressive, beautiful, moral, untainted and full of proficiency. So, in behalf of the veterinary profession, particularly of the national association which I here represent, and which he served so long and faithfully from member to its highest office, I assume the honor of committing his name to posterity.

Surviving Dr. Welch are his widow (née Elizabeth Kilgore) and two daughters.

WILLIAM ALBERT KUHNS

Dr. Wm. A. Kuhns, of Chaska, Minn., died September 11, 1935, following an illness of two weeks.

Born in Boston, Mass., March 12, 1872, Dr. Kuhns early displayed unusual musical talent. At the age of six, he began his study of the violin, making professional appearances in Boston theatres at nine. He attended public schools in Boston, subsequently continuing his musical education abroad. Upon his return to America, he joined the New York Symphony Orchestra, under the direction of the eminent Walter Damrosch. At that time he was the only native-born American in the nation to play the oboe.

Dr. Kuhns started his veterinary studies at the Veterinary Department of Harvard University, but transferred to the Ontario Veterinary College, from which institution he was graduated

in 1899. During the Boer war, Dr. Kuhns had a contract with the English government to accompany shipments of mules from New Orleans to South Africa. During the term of this contract, he made three trips. He began practicing at Paynesville, Minn., moving to Chaska in 1903.

Dr. Kuhns joined the A. V. M. A. in 1919. He was a member of the Minnesota State Veterinary Medical Society. Surviving are two sisters and two brothers, of Boston, Mass., where burial was made.

J. P. F.

JAMES EDMOND HENDERSON

Dr. J. E. Henderson, of Wyoming, Ill., died at his home, September 30, 1935. The end came while he slept and followed a stroke of apoplexy.

Born in Marshalltown, Iowa, April 28, 1872, Dr. Henderson moved to Toulon, Ill., with his family when he was four years of age. He attended local schools and then entered the Chicago Veterinary College. Following his graduation in 1907, he located at Wyoming, Ill., where he practiced his profession up until the time of his death. Dr. Henderson is survived by his widow, one daughter, one son, one sister and two brothers.

JAMES L. DAUGHERTY

Dr. James L. Daugherty, of Danville, Ind., died October 6, 1935, while being taken to a hospital in Indianapolis for an operation to relieve an obstruction of the intestines. More than 20 years previously, Dr. Daugherty had undergone an operation to correct a condition which is now commonly referred to as "upside-down stomach."

Born at Danville, August 30, 1876, Dr. Daugherty attended local schools and then entered the McKillip Veterinary College in Chicago. He was graduated in 1913 and practiced for about a year at Arrowsmith, Illinois. He then located at Danville, Ind., and built up a large practice there.

Dr. Daugherty joined the A. V. M. A. in 1920. He was a member of the Indiana Veterinary Medical Association, the West Central Indiana Veterinary Medical Association, the Ladoga Lodge of Odd Fellows and the Danville Commercial Club. He was active in Democratic politics and was a delegate to the state convention held recently. He is survived by his widow, one daughter and one sister.

ALBERT G. VANTINE

Dr. Albert G. VanTine, of Clarence, N. Y., died at his home, September 23, 1935, at the age of 71. He had an attack of heart trouble in June, which confined him to his bed for about two weeks. He partially recovered during the summer, but had a relapse about three weeks before his death. Dr. VanTine was graduated from the Ontario Veterinary College in 1898, and had practiced in Clarence for about 33 years. He was a Mason and an Odd Fellow. He is survived by his widow.

LEROY F. THOMPSON

Dr. LeRoy F. Thompson, of Fort Worth, Texas, died at his residence, October 14, 1935, at the age of 45. He was a graduate of the Kansas City Veterinary College, class of 1911. For four years following his graduation, he was in the employ of the U. S. Bureau of Animal Industry. Since 1915 he had been engaged in public welfare work in Fort Worth and, at the time of his death, was chief meat inspector for the Health and Welfare Department. Dr. Thompson was a member of Tarrant Lodge No. 942, F. and A. M. He is survived by his widow, his mother, two sisters and two brothers.

W. R. McC.

HERBERT STANLEY WOOTERS

Dr. Herbert S. Wooters, of Champaign, Ill., died in the Barnes Hospital at Saint Louis, Mo., October 16, 1935. He had entered the hospital a little more than a week previously. Death was caused by a tumor of the lung.

Born at Cowden, Ill., April 18, 1890, Dr. Wooters studied veterinary medicine at the Chicago Veterinary College. Following his graduation in 1913, he entered general practice. With the outbreak of the World War, Dr. Wooters received a commission as second lieutenant in the Veterinary Corps and reported at Camp Greenleaf, Ga., in June, 1918. Later he was assigned to duty with the 15th Division, at Camp Logan, Texas. Following the war, he located at Moweaqua, Ill., and from there went to Peoria. Later he located at Champaign and conducted a hospital for small animals there which was regarded as one of the best in central Illinois.

Dr. Wooters joined the A. V. M. A. in 1918. He was a member of the Illinois State Veterinary Medical Association, the Twelfth

International Veterinary Congress and Alpha Psi Fraternity. He held a commission as captain in the Veterinary Reserve Corps. He is survived by his widow, his mother, one brother and two sisters.

FREDERICK WILLIAM GRENFELL

Dr. Frederick W. Grenfell, of Washington, D. C., died at his home October 26, 1935, following a heart attack the day before.

Born in Calstock, Cornwall, England, June 1, 1865, Dr. Grenfell attended Harewood College and the New Veterinary College, Edinburgh, Scotland. As a student, he became a famous swimmer in his native country and was amateur swimming champion of the British Isles from 1885 to 1888. A trophy cabinet in his office contained many cups and other prizes as evidence of his prowess as a swimmer. Following his graduation, in 1888, he came to America and located in Washington, where he established a very extensive practice. He opened a veterinary hospital on E Street North West, between 14th and 15th Streets. Among his clients were former presidents of the United States, members of presidential cabinets, foreign diplomats and other distinguished persons.

Since 1920, Dr. Grenfell had been official veterinarian for the District of Columbia and, at the time of his death, he was secretary-treasurer of the Veterinary Examining Board of the District of Columbia. While the George Washington University maintained a College of Veterinary Medicine, he was professor of veterinary practice.

Dr. Grenfell joined the A. V. M. A. in 1918. He was a member of the Association of Oldest Inhabitants of the District of Columbia and of Columbia Lodge No. 3, F. & A. M. He is survived by his widow and four sons, one of whom, Dr. Frederick A. Grenfell (Geo. Wash. '14), is a veterinarian.

PERSONALS

MARRIAGES

DR. HENRY J. APPLE (O. S. U. '35), of Lima, Ohio, to Dr. Ella L. Ackermann, of Columbus, Ohio, at Covington, Tenn., August 10, 1935.

DR. W. L. BENDIX (Ont. '28), of Dumbarton, Va., to Miss Susan Levering Crooks, of Richmond, Va., August 17, 1935.

DR. C. S. WATT (Chi. '15), to Mrs. Lizzie Edwards, both of Collinsville, Ill., August 26, 1935.

DR. LESTER PROCTOR (Iowa '34), of Hazleton, Iowa, to Miss Lucile Wade, of Wellman, Iowa, August 31, 1935.

DR. ROBERT L. BOOTH (U. P. '35), to Miss Doris Creighton, at Bayonne, N. J., September 21, 1935.

DR. J. H. BINNIG (O. S. U. '34), of Thompson, Ohio, to Miss Lenore Thomson, of Rocky River, Ohio, September 28, 1935.

BIRTH

To DR. and MRS. O. NORLING-CHRISTENSEN, of Chicago, Ill., a daughter, Harriet, June 9, 1935.

PERSONALS

DR. V. M. HENSLEY (Ont. '35) is associated with Dr. O. Norling-Christensen, of Chicago, Ill.

DR. C. L. LYNESS (Chi. '18), who has been practicing at LeRoy, Ill., since spring, has located at Vandalia, Ill.

DR. W. A. HECK (Iowa '91), who practiced at West Liberty, Iowa, for a number of years, is now located at Knox, Ind.

DR. L. W. THIELE (Chi. '14), formerly with the U. S. Bureau of Animal Industry, has located at Buchanan, Mich.

DR. J. B. SNYDER (McK. '11), of Kansas City, Mo., is the owner of some very fine imported and American bred Kerry Blue terriers.

DR. J. S. BARBER (Chi. '10), of Central Falls, R. I., has been appointed state veterinarian of Rhode Island, succeeding Dr. T. E. Robinson (Ont. '92).

DR. O. A. LONGLEY (San Fran. '03) has severed his connection with the Haver-Glover Laboratories, Kansas City, Mo., and has returned to California.

DR. WILLIAM G. DUNCAN (Colo. '32), of Englewood, Colo., has entered the service of the U. S. Bureau of Animal Industry again. He has reported at 303 U. S. Barge Office Building, New York, N. Y.

DR. JAMES M. MURPHY (U. P. '35) has been engaged to continue studies on periodic ophthalmia in horses, in coöperation with Dr. E. L. Stubbs (U. P. '11), at the University of Pennsylvania School of Veterinary Medicine.

DR. W. J. R. FOWLER (Ont. '99), of Guelph, Ont., has been made a Chevalier du Mérite Agricole de France by the French government. The honor was awarded in appreciation of Dr. Fowler's "splendid work on behalf of agriculture."

DR. P. M. GRAVES (U. S. C. V. S. '12), of Culpeper, Va., has returned from the University Hospital, at Charlottesville, Va., where he was confined for eleven days for treatment of a seriously injured hand, sustained in an automobile accident.

DR. C. B. LINE (Mich. '32), who has been a member of the staff of the College of Veterinary Medicine, Alabama Polytechnic Institute, for the past year, has been appointed animal pathologist to the Michigan Department of Agriculture and assistant animal pathologist at Michigan State College.

DR. D. R. COBURN (Mich. '24) has resigned his positions as animal pathologist, Michigan Department of Agriculture, and assistant animal pathologist, Michigan State College, to accept the newly created position of animal pathologist to the Michigan State Department of Conservation, effective October 1.